UMTS router UR5i a UR5i SL

USER'S GUIDE

ISO 9001:2001

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Symbols used

Danger – important notice, which may have an influence on the user's safety or the function of the device.

Attention – notice on possible problems, which can arise to in specific cases.

Information, notice – information, which contains useful advices or special interest.

GPL licence

Source codes under GPL licence are available free of charge by sending email on info@conel.cz.

Conel s.r.o., Sokolska 71, 562 04 Usti nad Orlici, Czech Republic
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1. Safety instruction

Please, observe the following instructions:

- The communication router must be used in compliance with all applicable international and national laws and in compliance with any special restrictions regulating the utilization of the communication router in prescribed applications and environments.
- To prevent possible injury to health and damage to appliances and to ensure that all the relevant provisions have been complied with, use only the original accessories. Unauthorised modifications or utilization of accessories that have not been approved may result in damage to the communication router and in a breach of applicable regulations. Unauthorized modifications or utilization of accessories that have not been approved may result in the termination of the validity of the guarantee.
- The communication router must not be opened. Only the replacement of the SIM card is permitted.
- **Caution!** The SIM card could be swallowed by small children.
- Voltage at the feed connector of the communication router must not be exceeded.
- Do not expose the communication router to extreme ambient conditions. Protect the communication router against dust, moisture and high temperature.
- It is recommended that the communication router should not be used at petrol stations. We remind the users of the duty to observe the restrictions concerning the utilization of radio devices at petrol stations, in chemical plants, or in the course of blasting works in which explosives are used.
- Switch off the communication router when travelling by airplane. Utilization of the communication router in a airplane may endanger the operation of the airplane or interfere with the mobile telephone network, and may be unlawful. Failure to observe these instructions may result in the suspension or cancellation of telephone services for the respective client, or, it may result in legal sanctions; it may also result in both eventualities.
- When using the communication router in the close proximity of personal medical devices, such as cardiac pacemakers or hearing aids, you must proceed with heightened caution.
- If it is in the proximity of TV sets, radio receivers and personal computers, the telephone may cause interference.
- It is recommended that you should create an appropriate copy or backup of all the important settings that are stored in the memory of the device.

2. Description of the router

2.1. *Introduction*

The UMTS router is a compact electronic device based on the UMTS module which enables data transfers using UMTS/HSDPA/HSUPA/EDGE/GPRS/GSM technologies.

Primarily, the router expands the capabilities of the UMTS module by the option of connecting more PC's by means of the built-in Ethernet interface. In addition, the firmware of the router provides automatic establishment and maintenance of UMTS/HSDPA/HSUPA/EDGE/GPRS/GSM PPP connection. By means of the integration of a DHCP server it provides the user with simple installation and Internet access.

In addition, the router is equipped with a two USB 1.1 Host interfaces which is designed only for connection to a USB device.

By customer request it is possible to equip the router with the XPORT module and extend the function of the UMTS router about RS232, RS485/RS422, M-BUS or CNT (I/O module).

The UMTS router has two versions. The first version is basic UR5i and the second version is UR5i SL in the aluminum box.

Examples of Possible Applications

- mobile office
- fleet management
- security system
- telematic
- telemetric
- remote monitoring
- vending and dispatcher machines

2.2. *UMTS technology*

For radio terrestrial part UMTS (Universal Mobile Telecommunication System), which is marked as UTRA (UMTS Terrestrial Radio Access), is warranted 155 MHz band in frequency band about the 2 GHz. It are bands 1900–1980 MHz, 2010–2025 MHz and 2110–2170 MHz.

The UMTS system is based on code division of carried channels – use the access method WCDMA (Wideband Code Division Multiple Access). WCDMA exploit direct spread spectrum DS (Direct Spread). For transmission the UMTS network exploits two duplex techniques – transmission modes FDD (Frequency Division Duplex), which is based on separate frequency channels (i.e. uplink and downlink uses different channels) and TDD (Time Division Duplex), which is based on separate time (i.e. uplink and downlink uses one channel, in which both direction are changes in time).

UMTS network consists of three basic entities:

- Basic network CN (Core Network) – own core of network UMTS,
- network UTRAN (UMTS Terrestrial Radio Access Network) – the radio access network,
- users part UE (User Equipment) – entity, which allows the user to access the UMTS network.

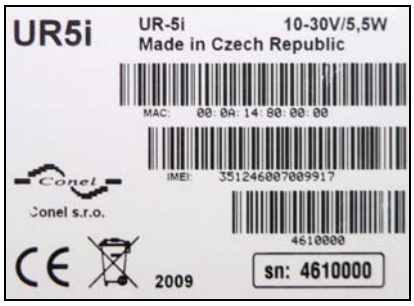
2.3. *HSxPA technology (High Speed Packet Access)*

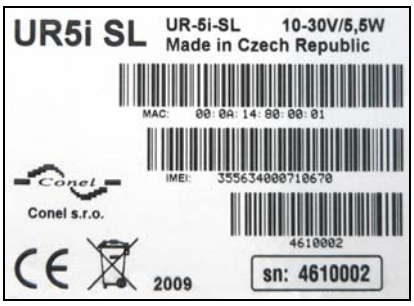
High Speed Download Packet Access and High Speed uplod' Packet Access are an improved and extended version of the UMTS-TDD. HSDPA/HSUPA is available for both UMTS FDD and for UMTS TDD. HSDPA/HSUPA raises significantly bit rate for downlink. It is attained on the programmer level. It doubles capacity on BTS (Base Transceiver Station), which allows process of data and signals from more users at one time. HSDPA/HSUPA are based on a few innovations of network architecture; thanks to this, it has lower latency, faster reaction on channel change quality and processing of H-ARQ (Hybrid automatic repeat request) on transmission repeat. Transport channel for HSDPA/HSUPA effectively uses available frequencies, on which transmits data packets together. Afterwards these packets are divides between individual users according to specific algorithms.

2.4. *Delivery Identification*

Specimen Label:

Trade name	Type name	Other
UR5i	UR-5i	Basic version
UR5i SL	UR-5i-SL	Version in the aluminum box

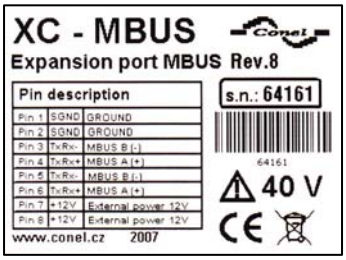


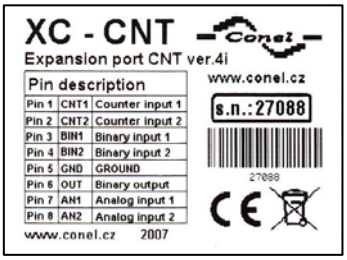


Example of expansion port XPORT:

Trade name	Type name	Power supply
Expansion port RS232	XC-232	Internal power supply
Expansion port RS485-RS422	XC-485-422	Internal/external power supply
Expansion port MBUS	XC-MBUS	External power supply
Expansion port CNT	XC-CNT	Internal power supply

XC - 232
Expansion port RS232
Pin description
s.n.: 22646
Pin 1 RTS Request To Send
Pin 2 CTS Clear To Send
Pin 3 DTR Data Terminal Ready
Pin 4 DSR Data Set Ready
Pin 5 GND GROUND
Pin 6 RXD Receive Data
Pin 7 CD Carrier Detect
Pin 8 TXD Transmit Data
22646
www.conel.cz 2007


XC - MBUS
Expansion port MBUS Rev.8
Pin description
s.n.: 64161
Pin 1 SGND GROUND
Pin 2 SGND GROUND
Pin 3 TxRx- MBUS B (-)
Pin 4 TxRx+ MBUS A (+)
Pin 5 TxRx- MBUS B (-)
Pin 6 TxRx+ MBUS A (+)
Pin 7 +12V External power 12V
Pin 8 +12V External power 12V
64161
40 V
www.conel.cz 2007


XC - CNT
Expansion port CNT ver.4i
www.conel.cz
Pin description
Pin 1 CNT1 Counter input 1
Pin 2 CNT2 Counter input 2
Pin 3 BIN1 Binary input 1
Pin 4 BIN2 Binary input 2
Pin 5 GND GROUND
Pin 6 OUT Binary output
Pin 7 AN1 Analog input 1
Pin 8 AN2 Analog input 2
s.n.: 27088
27088
www.conel.cz 2007

Basic delivered set of router includes:

- UMTS router,
- power supply,
- crossover UTP cable,
- external antenna,
- plastic clips for the DIN rail with fixing screws,
- installation CD containing instructions.

In addition to the basics it is possible to deliver:

- expansion port RS232, RS485/RS422, M-BUS or CNT (separation columns are in distribution).

The router standard designed for:

- possibility to be put on a work surface,
- for mounting onto a DIN rail, the plastic clips are included.

2.5. *Antenna Connection*

The antenna is connected to the router using the FME connector on the back panel.

External antennas:

2.6. *SIM Card Reader*

The SIM card readers for 3 V and 1.8 V SIM cards are located on the front panel of the router. To initiate the router into operation it is necessary to insert an activated SIM card with unblocked PIN in the reader. The SIM cards might be of different adjusted APN (Access Point Name).

2.7. *Power Supply*

The router requires +10 V DC to +30 V DC supply. Protection against reversed polarity without signaling is built into the router.

The power consumption during receiving is 1 W. The peak power consumption during data sending is 5,5 W. The peak power consumption when USB port used is 15 W. For correct operation it is necessary that the power source is able to supply a peak current of 1,3 A.

2.8. *Technical parameters*

UMTS/HSDPA/HSUPA/EDGE/GPRS/GSM module		
Complies with standards		EN 301 511, v9.0.2, EN 301 908-1&2, v3.2.1, ETSI EN 301 489-1 V1.8.1, EN 60950-1:06 ed.2
HSDPA parameters		3GPP rel. 5 standard bitrate 7,2 Mbps UE CAT. 1 to 6, 8, 12
HSDPA parameters		3GPP rel. 5 standard bitrate 2,0 Mbps UE CAT. 1 to 3, 5, 6
UMTS parameters		W-CDMA FDD standard PS bitrate – 384/384 kbps CS bitrate – 64/64 kbps
GPRS parameters		GPRS multislot class 12, CS 1 to 4 EGPRS multislot class 12, CS 1 to 4, MCS 1 to 9
Transmit power		Class 3 (+23dBm) for UMTS 2100MHz
Recommended antenna return loss		≤10 dB
Temperature range	Function Storage	-20 °C to +55 °C -40 °C to +85 °C
Supply voltage		10 to 30 V DC
Consumption	Reception GPRS UMTS/HSDPA	300 mW to 3,5 W (GPRS transmission) to 5,5 W (UMTS/HSDPA transmission)
Dimensions		42x86x94 mm (DIN rail 35 mm)
Weight		250 g
Antenna connector		FME – 50 Ohm
User interface	ETH USB XPORT	Ethernet (10/100 Mbit/s) 2x USB 1.1 type A host Optional RS232/RS485-422/M-BUS or inputs/outputs (I/O)

2.9. *Description of the individual components of the router*

2.9.1. UMTS module

The UMTS module is used for UMTS/HSDPA/HSUPA/EDGE/GPRS/GSM UMTS network wireless communication. It is integrated in the printed circuit board. The slide-out SIM card reader is accessible from the front panel. The FME antenna connector is accessible from the back panel.

UMTS Module

- Communicates in UMTS band 2100MHz
- CS bitrate – 64/64 kbps
- PS bitrate – 384/384 kbps
- Supports W-CDMA FDD (Wideband - Code Division Multiple Access Frequency Division Duplex) standard

2.9.2. Control microcomputer

The core of the router is a 32-bit microprocessor with 64 MB RAM, 32 MB FLASH EEPROM, serial interface RS-232 and an Ethernet interface 10/100 Mbit/s. The microcomputer is connected to the UMTS OEM module through the USB interface and controls the communication via UMTS/HSDPA/HSUPA/EDGE/GPRS/GSM. Towards to the user it is connected on the Ethernet interface.

The software is built on the Linux operating system.

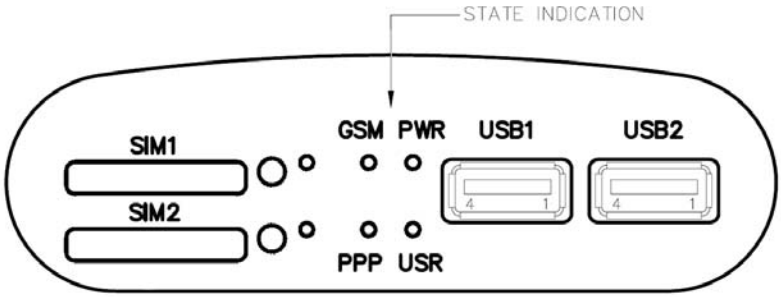
The router support services as like DHCP, NAT, GRE, IPsec tunnels, etc.

The modem settings are saved in the FLASH EEPROM memory. All modem configurations can be done through a web interface (HTTP), which is protected by security password.

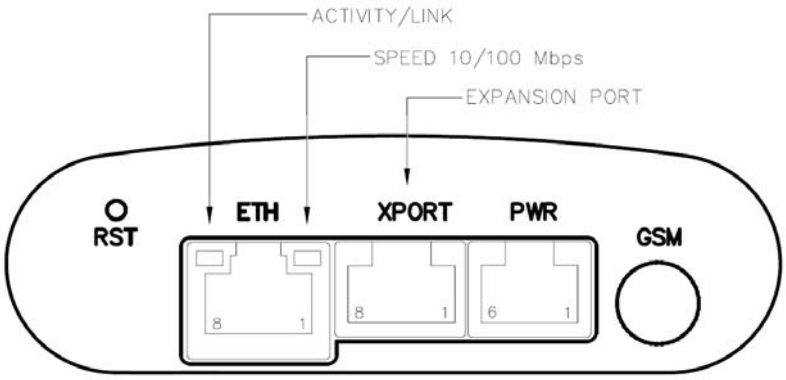
2.10. *User interfaces (Connectors)*

On the back panel of router the following connectors are located:

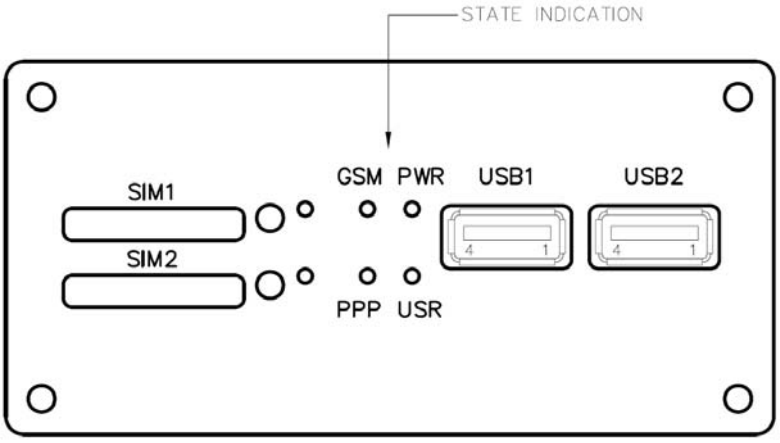
- one RJ12 or MRT9 connector (PWR) – for connection of the power supply adapter,
- one RJ45 connector (ETH) – for connection into the local equipment,
- one RJ45 connector (optional XPORT) – for connection of the local any arrangement,
- one MRT9 (I/O) – interface with one binary input and with one binary output (only version UR5i SL)
- one FME or SMA connector (GSM) – for connection of the antenna,
- two USB-A Host connectors (USB) – for connection of the devices to the router, USB's supports equipments with PL-2303 and FTDI USB/RS232 converter.



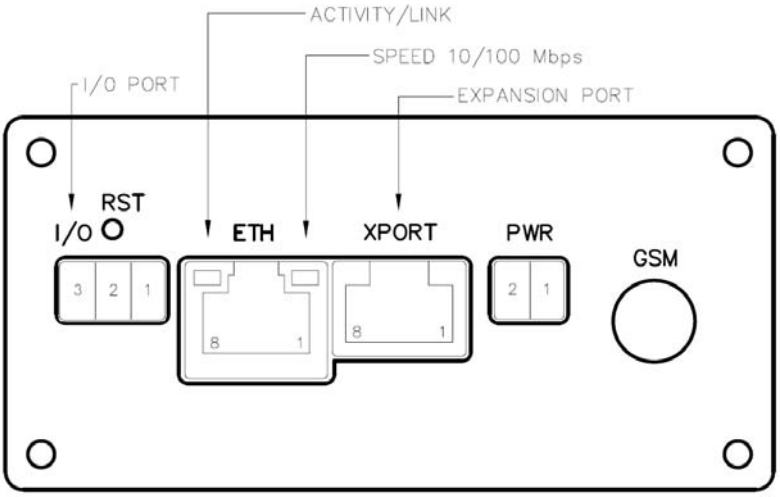
Front panel UR5i



Rear panel UR5i



Front panel UR5i SL



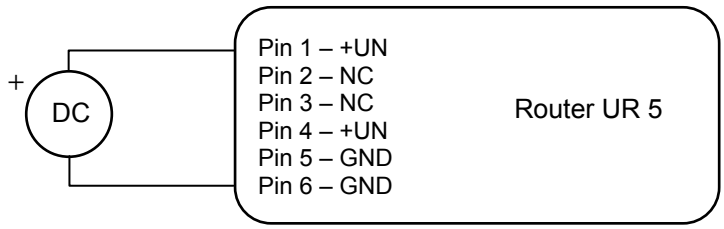
Rear panel UR5i SL

2.10.1. Connection of the PWR Supply Connector

Panel socket RJ12.

Pin number	Signal mark	Description
1	+UN	Positive pole of DC supply voltage (+10 to +30 V)
2	NC	Signal not connected
3	NC	Signal not connected
4	+UN	Positive pole of DC supply voltage (+10 to +30 V)
5	GND	Negative pole of DC supply voltage
6	GND	Negative pole of DC supply voltage

Circuit example:



- Panel socket MRT9.

Pin number	Signal mark	Description
1	+UN	Positive pole of DC supply voltage (+10 to +30 VDC)
2	GND	Negative pole of DC supply voltage

Circuit example:

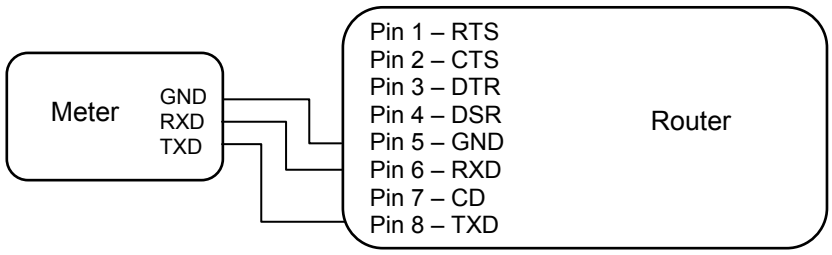
The positive pole +UN is marked by a red socket on the power supply.

2.10.2. Connection of the XPORT Connector – RS232

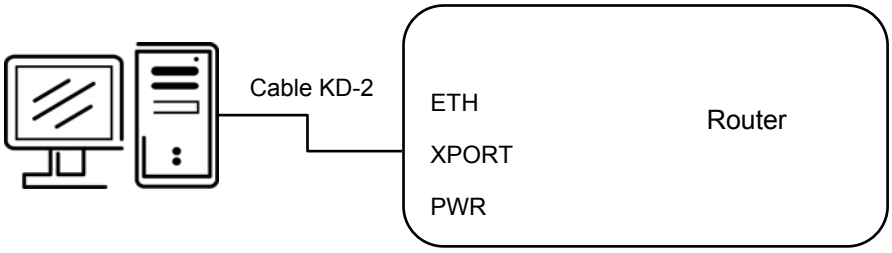
Panel socket RJ45 (RS232 – DCE – Data Communication Equipment).

Pin number	Signal mark	Description	Data flow direction
1	RTS	Request To Send	Input
2	CTS	Clear To Send	Output
3	DTR	Data Terminal Ready	Input
4	DSR	Data Set Ready – connected to +4 V through 330 Ohm	Output
5	GND	GROUND – signal ground	
6	RXD	Receive Data	Output
7	CD	Carrier Detect	Output
8	TXD	Transmit Data	Input

Circuit example:

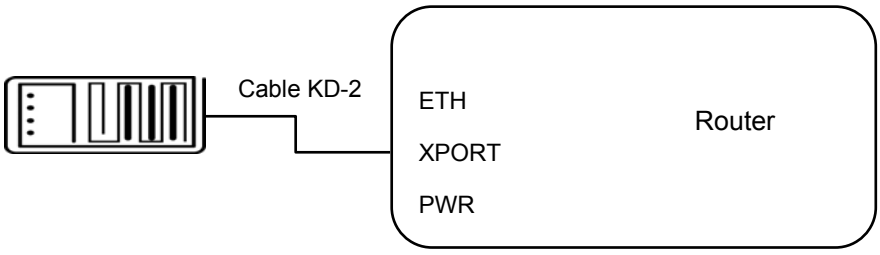


The router connection to the PC:



- cable KD2 is connected to serial port PC (example COM1)

The router connection to equipment with full-value RS232 interface:



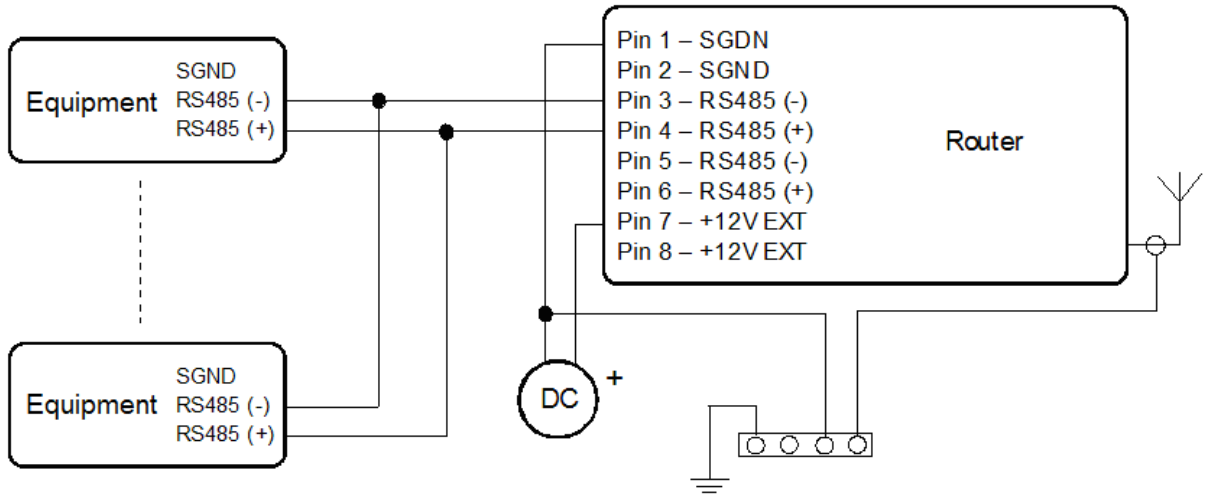
2.10.3. Connection of the XPORT Connector – RS485

Panel socket RJ45.

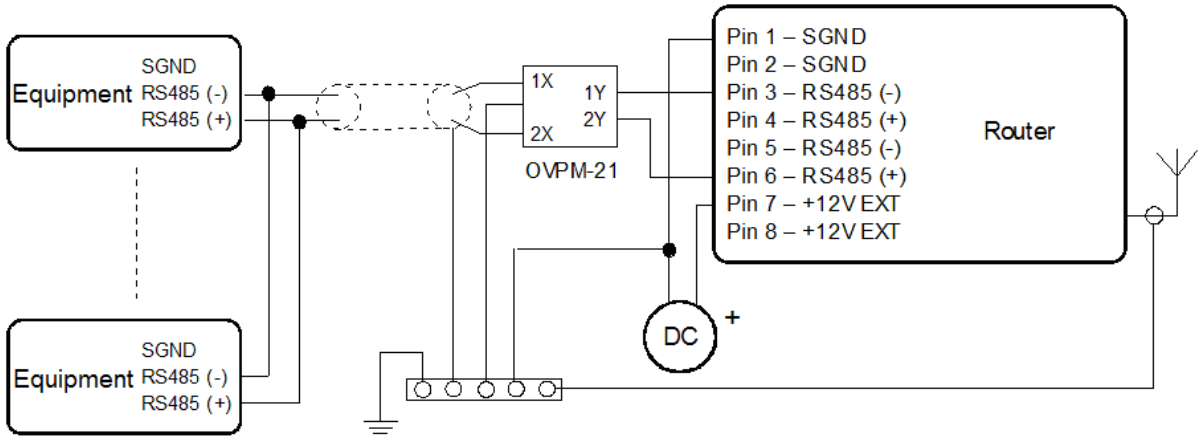
Pin number	Signal mark	Description	Data flow direction
1	GND	Signal and supply ground	
2	GND	Signal and supply ground	
3	TxRx-	RS485 B (-)	Input/Output
4	TxRx+	RS485 A (+)	Input/Output
5	TxRx-	RS485 B (-)	Input/Output
6	TxRx+	RS485 A (+)	Input/Output
7	+12 V EXT	External power supply	
8	+12 V EXT	External power supply	

ATTENTION! Power supply is selected on the expansion port RS485 by help of a jumper, 2.12. If galvanic separation is required the converter must have an external power supply.

Circuit example of the equipment with a router with data length less then 10 m:



Circuit example of the equipment with a router with data length more than 10 m:



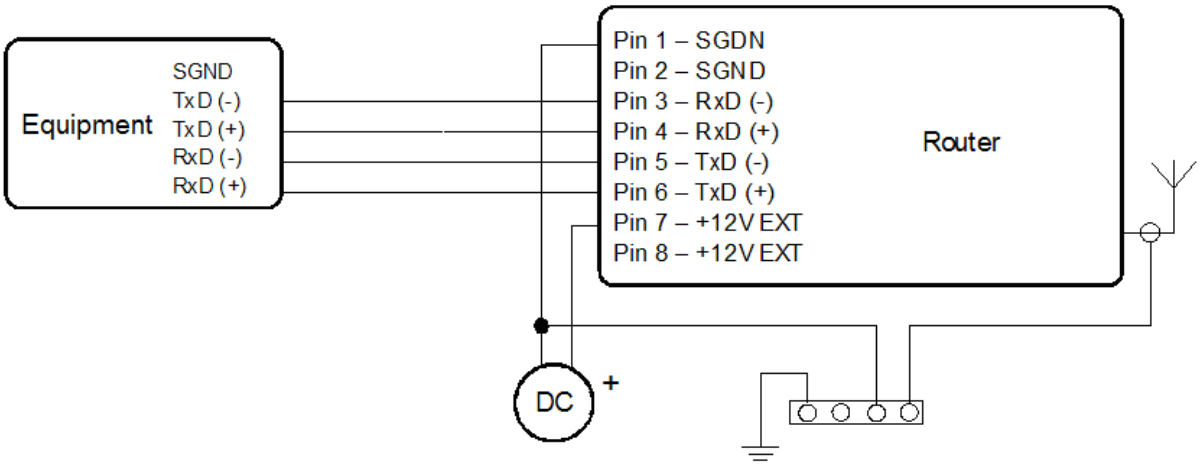
At RS485 data cable more then 10m it is need to use overvoltage protection on the router side!

2.10.4. Connection of the XPORT Connector – RS422

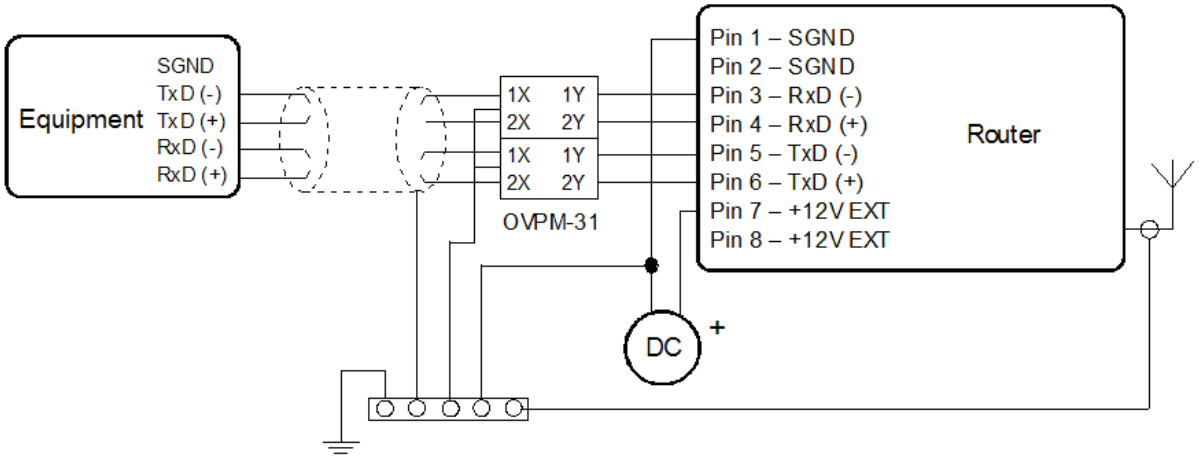
Pin number	Signal mark	Description	Data flow direction
1	SGND	Signal and power supply ground	
2	SGND	Signal and power supply ground	
3	RxD-	Receive Data (-)	Output
4	RxD+	Receive Data (+)	Output
5	TxD-	Transmit Data (-)	Input
6	TxD+	Transmit Data (+)	Input
7	+12V EXT	External power supply	
8	+12V EXT	External power supply	

ATTENTION! Power supply is selected on the expansion port RS422 by help of a jumper, 2.12. If galvanic separation is required the converter must have an external power supply.

Circuit example of the equipment with router with data length less then 10 m:



Circuit example of the equipment with a router with data length more than 10 m:



At RS422 data cable more then 10m it is need to use overvoltage protection on the router side!

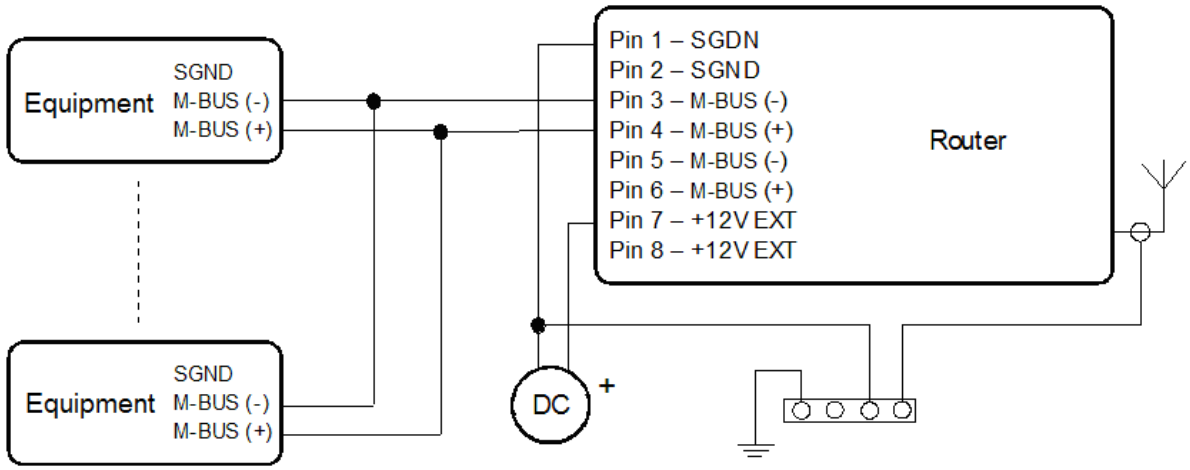
2.10.5. Connection of the XPORT Connector – MBUS

Panel socket RJ45.

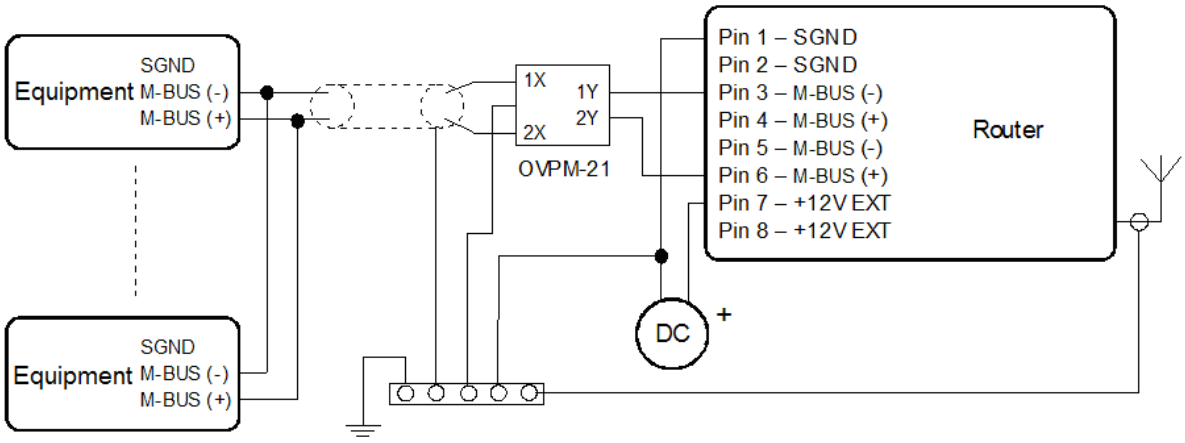
Pin number	Signal mark	Description	Data flow direction
1	GND	Signal and supply ground	
2	GND	Signal and supply ground	
3	TxRx-	MBUS B (-)	Input/Output
4	TxRx+	MBUS A (+)	Input/Output
5	TxRx-	MBUS B (-)	Input/Output
6	TxRx+	MBUS A (+)	Input/Output
7	+12 V EXT	External power supply	
8	+12 V EXT	External power supply	

ATTENTION! External supply is for converter MBUS!
If galvanic separation is required the converter must have external power supply.

Circuit example of the equipment with a router with data length less than 10 m:



Circuit example of the equipment with a router with data length more than 10 m:



If an M-BUS data cable more then 10m it is need to use overvoltage protection on the router side!

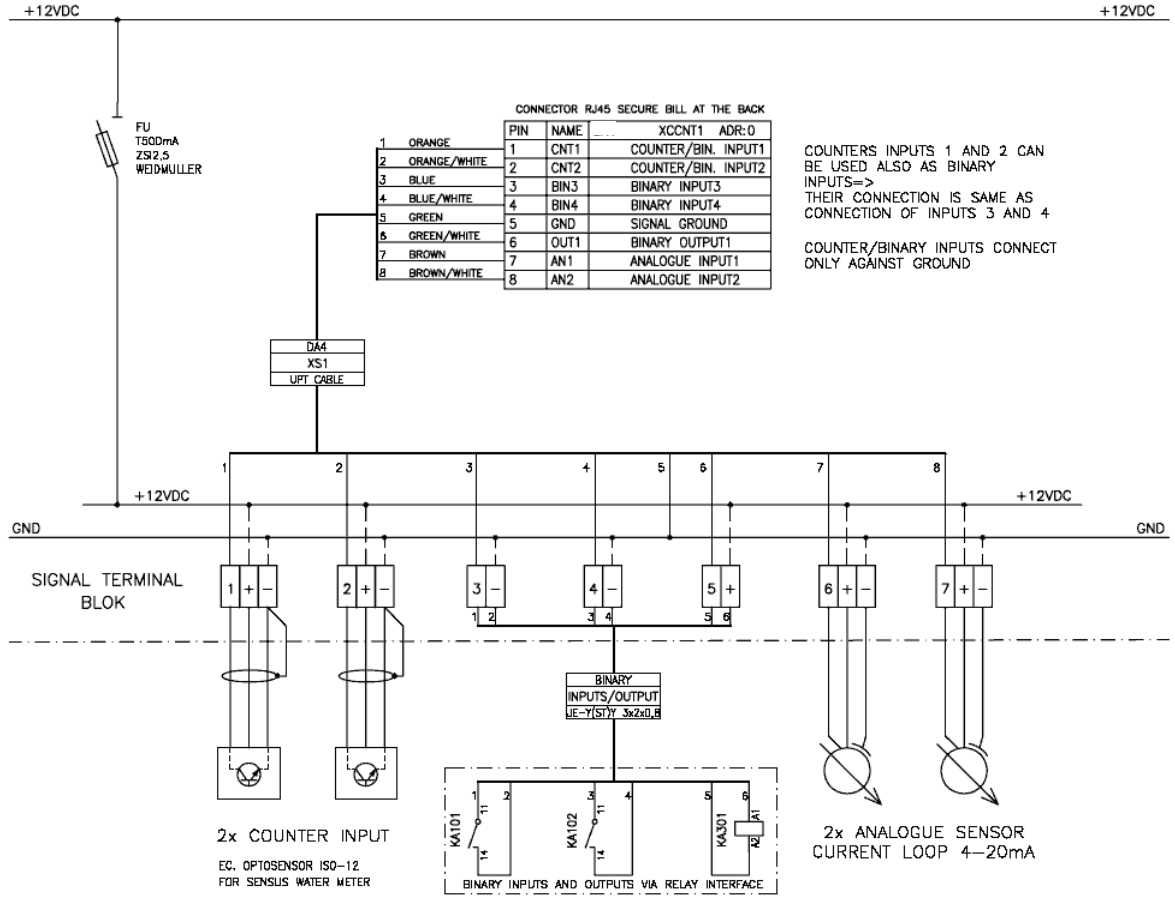
2.10.6. Connection of the XPORT Connector – CNT

Panel socket RJ45.

Pin number	Signal mark	Description	Data flow direction
1	BIN1/CNT1	Binary input/counter input	Input
2	BIN2/CNT2	Binary input/counter input	Input
3	BIN3	Binary input	Input
4	BIN4	Binary input	Input
5	GND	Signal ground	
6	OUT1	Binary output (open collector)	Output
7	AN1	Analogy input	Input
8	AN2	Analogy input	Input

The user interface CNT is for monitoring and processing of analogy and binary signals and to control (settings) of binary signal. To disposition are 2 counter and 2 binary inputs or 4 binary inputs, 2 analogy inputs a 1 binary output. The settings of binaries and counters inputs by the help of firmware in which it is defined the singles inputs and output.

Typical connection of the router measuring circuits:



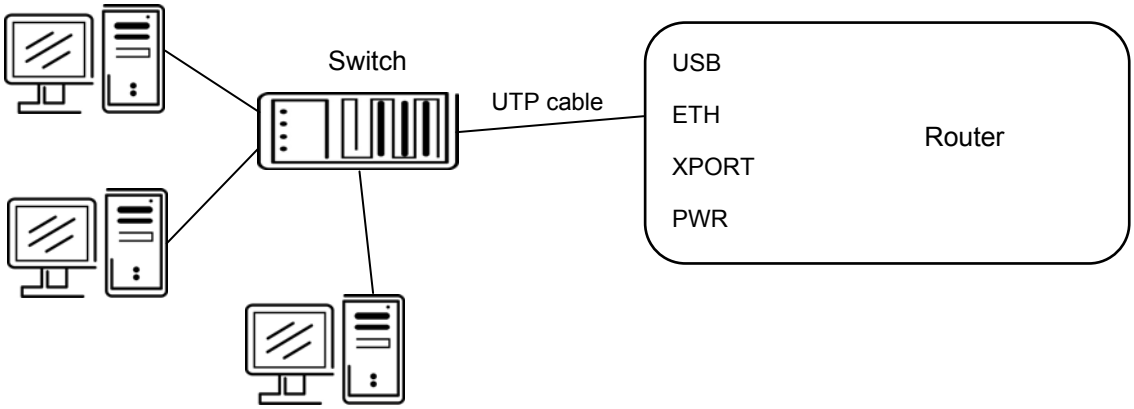
2.10.7. Connection of the ETH Connector

Panel socket RJ45.

Pin number	Signal mark	Description	Data flow direction
1	TXD+	Transmit Data – positive pole	Input/Output
2	TXD-	Transmit Data – negative pole	Input/Output
3	RXD+	Receive Data – positive pole	Input/Output
4	---	---	
5	---	---	
6	RXD-	Receive Data – negative pole	Input/Output
7	---	---	
8	---	---	

ATTENTION! Port ETH is not POE (Power Over Ethernet) compatible!

The ETH router connection:

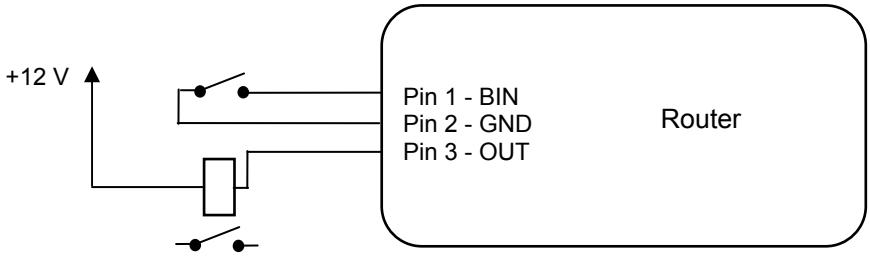


2.10.8. Connection of the I/O Connector

Pin number	Signal mark	Description	Data flow direction
1	BIN	Binary input	Input
2	GND	Signal ground	
3	OUT	Binary output	Output

The user interface I/O is for processing of binary input signal and to control (settings) of binary output signal.

The I/O router connection:



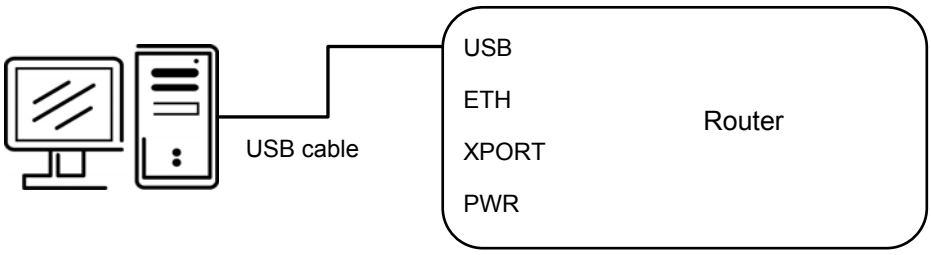
I/O port is part of the UR5i SL version only.

2.10.9. Connection of the Connector USB

Panel socket USB-A.

Pin number	Signal mark	Description	Data flow direction
1	VCC	Positive pole of 5V DC supply voltage	
2	USB data -	USB data signal – negative pole	Input/Output
3	USB data +	USB data signal – positive pole	Input/Output
4	GND	Negative pole of DC supply voltage	

The USB router connection:



2.11. *Technical specification of I/O port*

Port IO		
Environment	Operating temperature	-20 .. +55 °C
Input/Output	Binary input	reed contact with trigger level 1,3 up to 1,4 V
	Binary output	120 mA/max. 30 V

I/O port is part of the UR5i SL version only.

2.12. *Technical specification of optional XPORT*

- Expansion port RS232

Expansion port RS232		
Power supply	Internal	....
Environment	Operating temperature	-20 .. +55 °C
	Storage temperature	-20 .. +85 °C
Standards	Emission	EN 55022/B
	Immunity	ETS 300 342
	Safety	EN 60950
RS232 specifications (EN 1434)	Max. operating bus current	15 mA
	Max. bit rate	230400 bps
	Max. overvoltage	±30 V
	Max. total cable length (300Bd, 200nF/km)	20 m

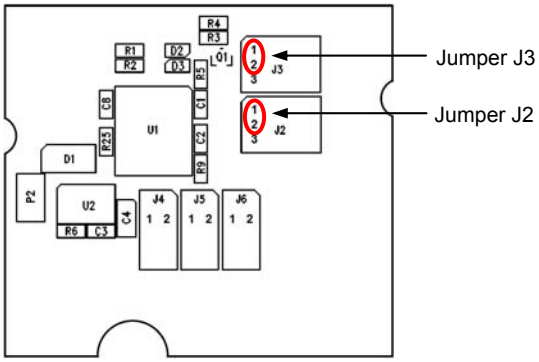
- Expansion port RS485

Expansion port RS485-RS422		RS485	RS422
Power supply	External	+10 .. +30 V	
	Internal	....	
	Supply power	Max. 1 W	
	Supply current	Max. 4 mA	
Environment	Operating temperature	-20 .. +55 °C	
	Storage temperature	-20 .. +85 °C	
Standards	Emission	EN 55022/B	
	Immunity	ETS 300 342	
	Safety	EN 60950	
RS485 specifications (EN 1434)	Max. devices (each 1,5 mA)	256	
	Max. bit rate	38400 bps	
	Short circuit strength	Permanent	
	Max. total cable length (300Bd, 200nF/km)	1200 m	

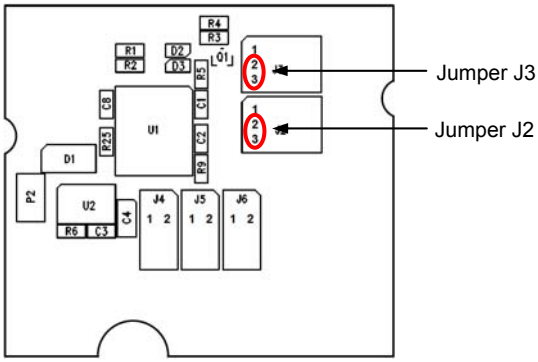
External or internal power supply of module Expansion port RS485/RS422 can be made by wiring jumpers J2 and J3 on this module. If external power supply of the module is required, jumpers J2 and J3 must be connected to pins 2 - 3. Internal power supply is made by connecting pins 1 - 2 with jumpers J2 and J3.

Interface behaviour of module Expansion port RS485/RS422 can be made by wiring jumpers J4, J5 and J6 on this module. If RS485 is required, jumpers J4 and J5 must be connected and jumper J6 disconnected. If RS422 is required, jumpers J4 and J5 must be disconnected and jumper J6 connected.

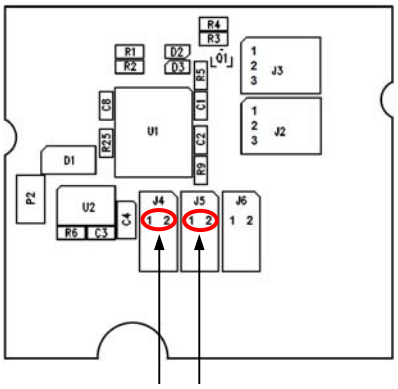
Jumper placement can be seen in the picture below (module Expansion port RS485/RS422 from TOP layer). We recommend that internal power supply is only chosen in the event that it is not possible to ensure external power supply. If internal power supply is chosen, converter RS485/RS422 is not galvanic separated.



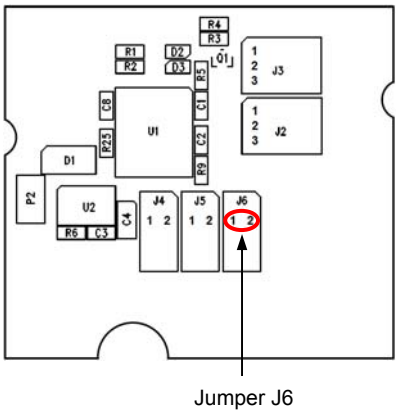
The jumper circuitry for internal supply



The jumper circuitry for external supply



The jumper circuitry for RS485



The jumper circuitry for RS422

- Expansion port MBUS

Expansion port MBUS		
Power supply	Voltage	+10 .. +30 V
	Supply power	Max. 4 W
Environment	Operating temperature	-20 .. +55 °C
	Storage temperature	-20 .. +85 °C
Standards	Emission	EN 55022/B
	Immunity	ETS 300 342
	Safety	EN 60950
M-Bus specifications (EN 1434)	Max. devices (each 1,5 mA)	30
	Max. operating bus current	60 mA
	Overload detection	100 mA
	Short circuit strength	Permanent
	Bus voltage mark	36 .. 43 V
	Bus voltage space	24 .. 31 V
	Max. total cable length (300Bd, 200nF/km)	1000 m

- Expansion port CNT

Expansion port CNT		
Power supply	Internal	….
	Sleep	100 µA (counter is functional)
	Operation	2 mA
Environment	Operating temperature	-20 .. +55 °C
	Storage temperature	-20 .. +85 °C
Standards	Emission	EN 55022/B
	Immunity	ETS 300 342
	Safety	EN 60950
	Isolation	EN 60747
Inputs/Outputs	2x counter	Max. 100 Hz, ratio max. 1:10
	2x analogy inputs	0 .. 20 mA, R_{in} 100 Ohms
	2x binary inputs	reed contact
	1x output (open collector)	100 mA
Others	Voltage resistance	Permanent
	Sleeping mode	Controlled

2.13. *Modem status indication*

On the front and back panel of the modem there are altogether four LED indicators, which inform on the modem status.

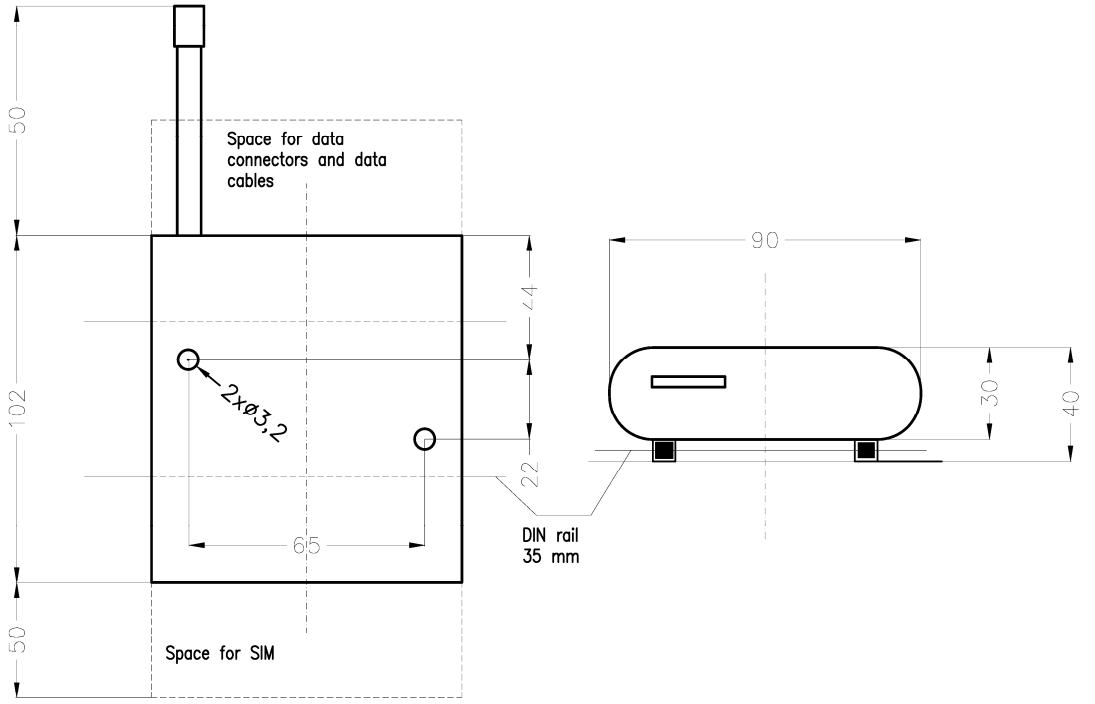
Panel	Color	Description	Description
Front	Green	PWR	Permanently on ……. starting of the router Blinking 1:9 ..... router is active
	Red	GSM	Blinking …….. communication in progress
	Yellow	USR	Defined by user's firmware
	Green	PPP	Permanently on ……. join connection
	Yellow	SIM1	Permanently on ……. switch to the SIM1
	Yellow	SIM2	Permanently on ……. switch to the SIM2
Back	Green	–	On ..... selected 100 Mbit/s Off ..... selected 10 Mbit/s
	Green	–	On..... the network cable is connected Blinking …….... data transmission Off ..... the network cable is not connected

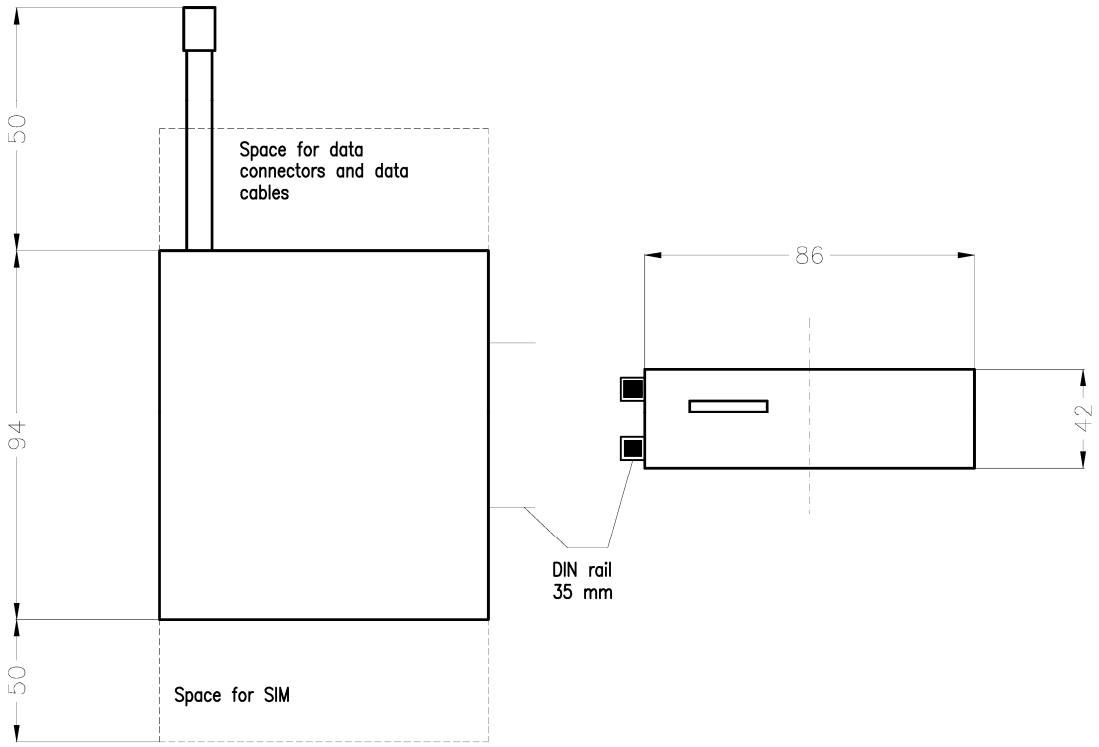
2.14. *Putting into operation*

Before putting the UR5i or UR5i SL router into operation it is necessary to connect all components needed for the operation of your applications and the SIM card must be inserted (the modem is off).

The modem is put into operation by connection of the power supply to the router. In the default setting the modem starts to login automatically to the preset APN. The behavior of the router can be modified by means of the web interface which is described in the following chapter.

2.15. *Mechanical external dimensions and mounting recommendations*





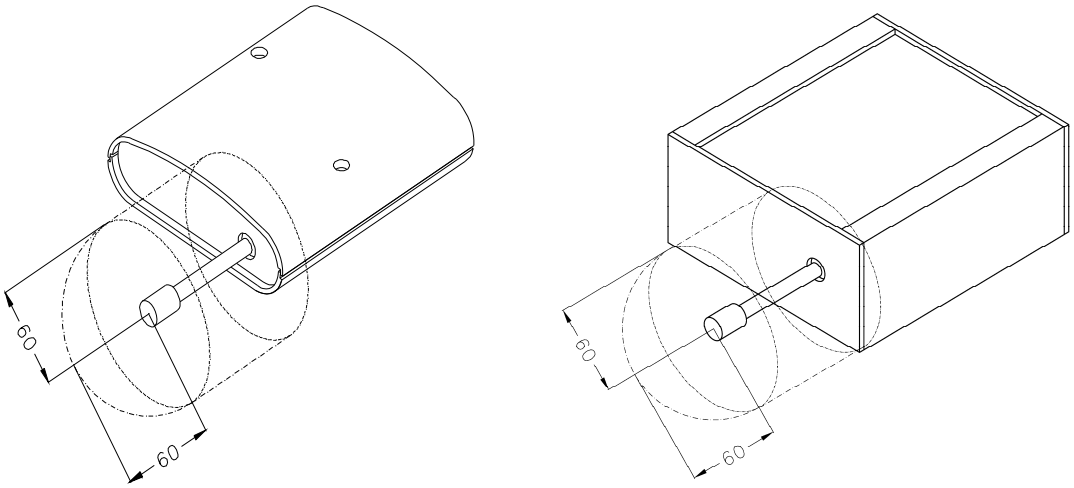
For the majority of applications with a built-in router in a switch board it is possible to recognize two sorts of environments:

- no public and industry environment of low voltage with high interference,
- public environment of low voltage without high interference.

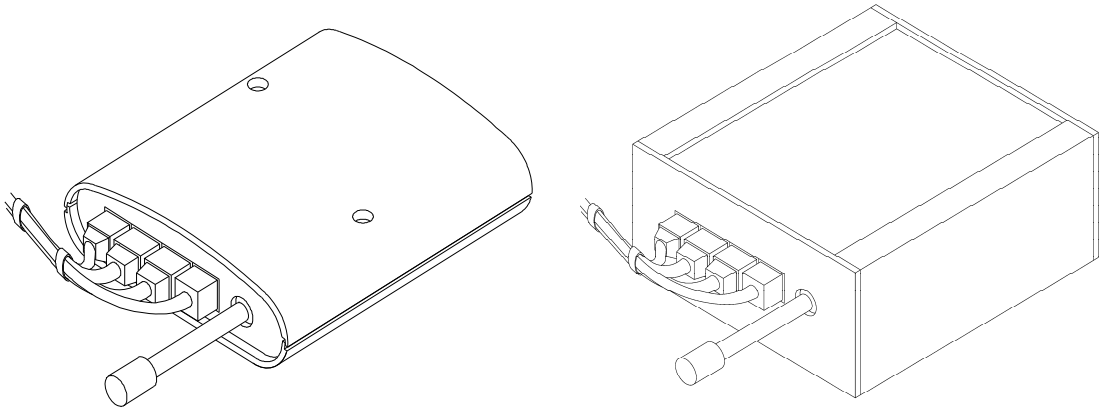
For both of these environments it is possible to mount routers to switch board, the following it is not need have no examination immunity or issues in connection with EMC according to EN 60439-1 ed.2.

For compliance of EN 60439-1 ed.2 specification it is necessary observe next assembly of the router to the switch - board:

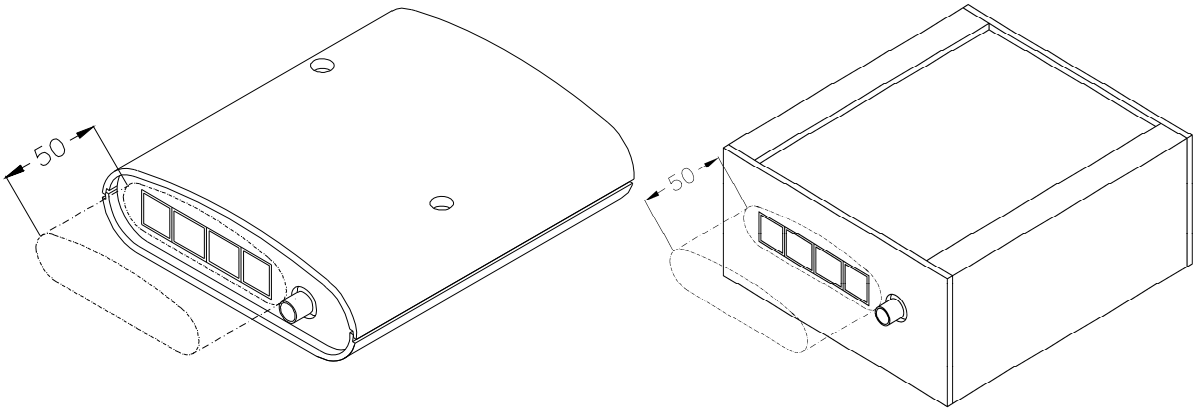
- round antenna we recommend to observe a distance of 6 cm from cables and metal surfaces on every side according to the next picture due to the elimination of interference, while using an external antenna except for the switch-board it is necessary to fit a lightening conductor,
- before mounting a router on sheet-steel we recommend using an external antenna,



- for single cables we recommend to bind the bunch according to the following picture, for this use we recommend:
  - length of the bunch (combination of power supply and data cables) can be maximum 1,5 m, if length of data cables exceeds 1,5 m or in the event of, the cable leads towards the switch - board, we recommend to use fit over - voltage protectors (surge suppressors),
  - with data cables they mustn't carry cables with reticular tension ~ 230 V/50 Hz,
  - all signals to sensors must be twisted pairs.

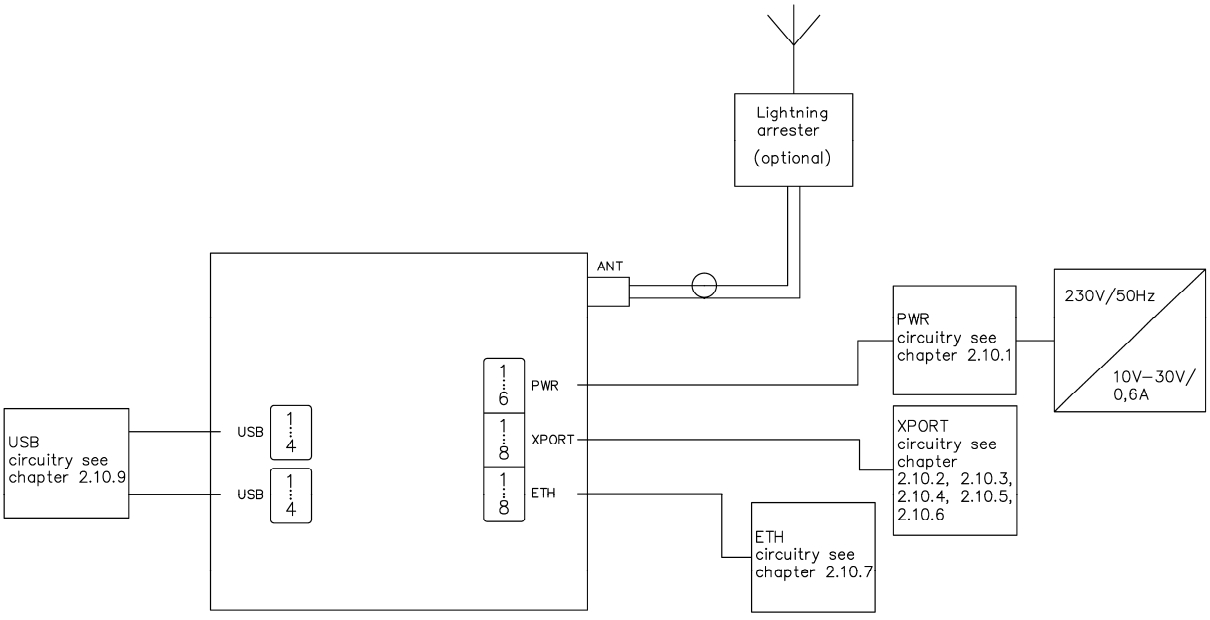


- sufficient space must be left before individual connectors for handling of cables,

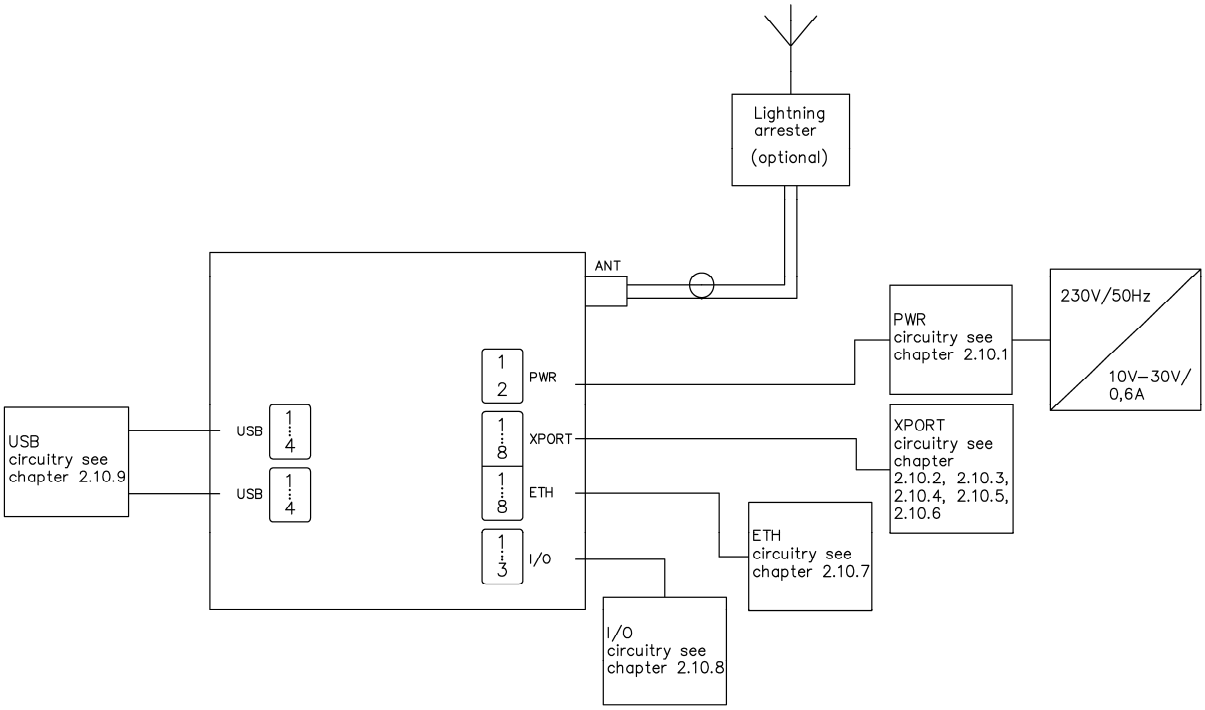


- for correct function of the router we recommend to use in switch - board earth-bonding distribution frame for grounding of power supply of router, data cables and antenna,

- the circuit diagram of the UR5i router is on the following pictures,



- the circuit diagram of the UR5i SL router is on the following pictures.

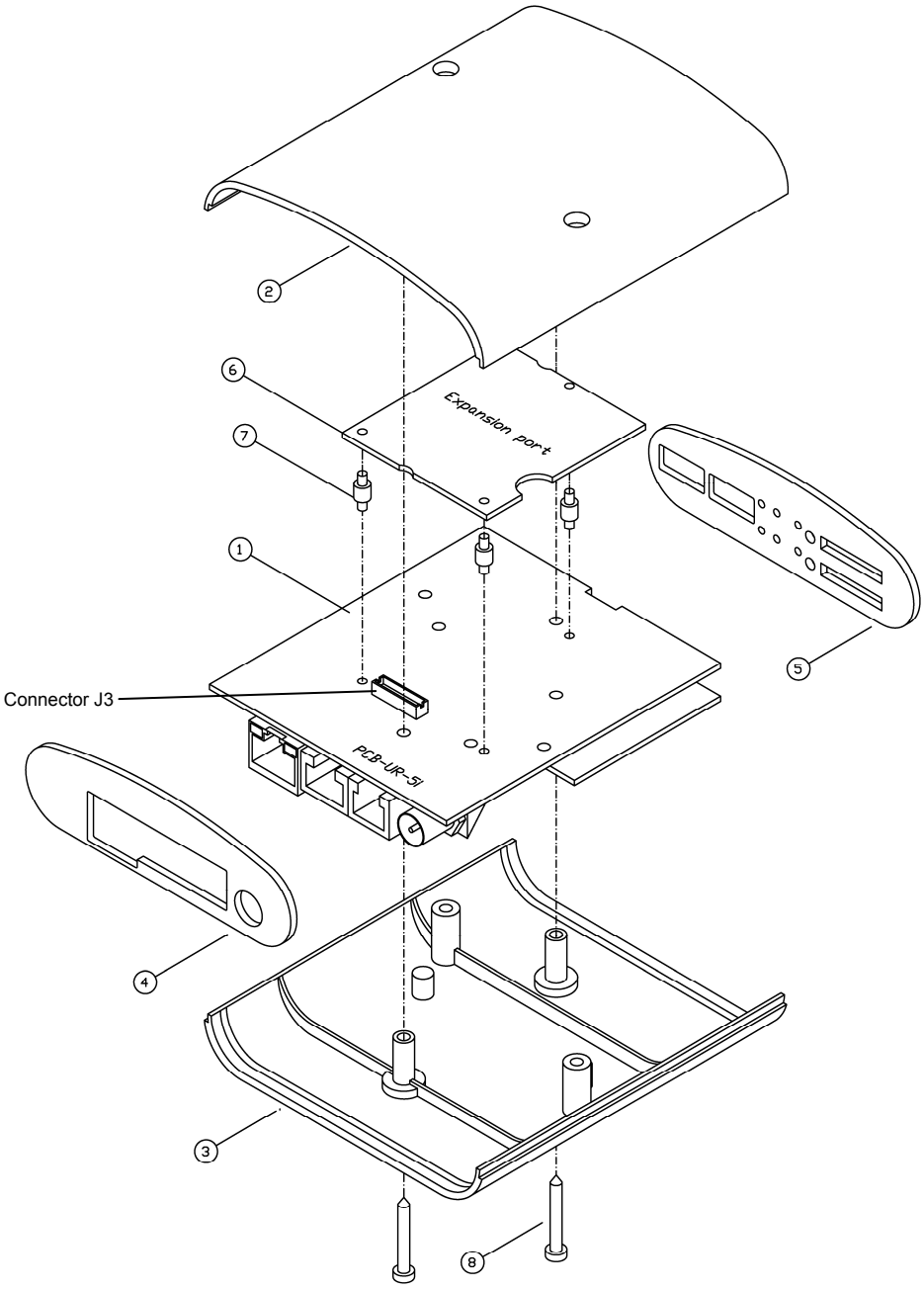


3. Expansion port mounting

3.1. *Expansion port mounting for UR5i*

Attention! Expansion port XPORT include when the router UR5i is switch off.

After unscrewed two screws (position 8) on box bottom part (position 3) and carried out box top part (position 2) the expansion port XPORT (position 6) connect to connector J3 (see below) of the router B-UR-5i motherboard (position 1) from TOP side. Expansion port is mounted to motherboard by the help of three distant columns (position 7). After expansion port mounting the box is screwed by the help three screws (position 8).



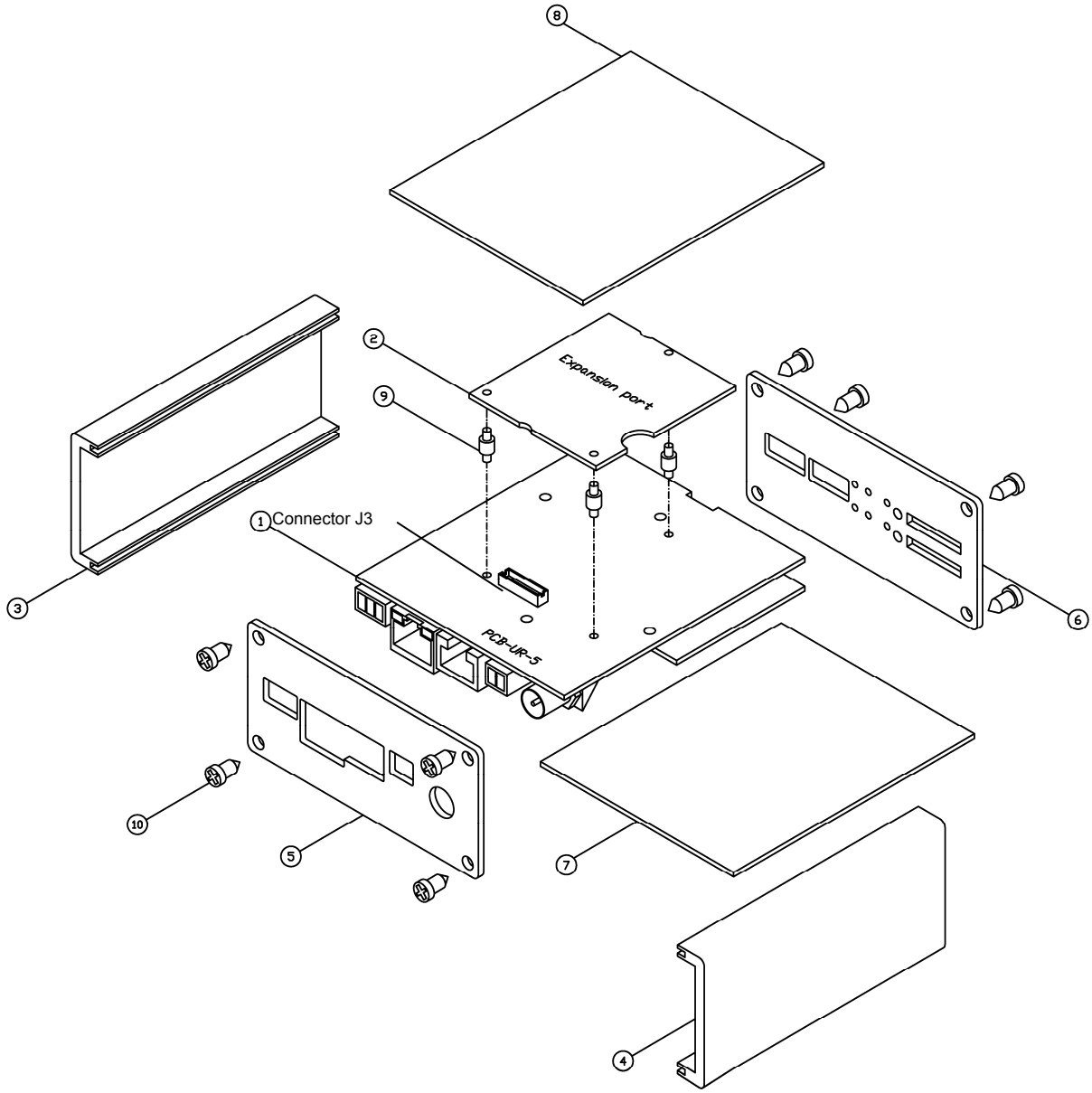
Parts list and description

Part	Description	Number
1	UMTS router motherboard	1
2	Box top part	1
3	Box bottom part	1
4	Rear head	1
5	Front head	1
6	Expansion port	1
7	Distant columns for expansion port XPORT mounting to motherboard	3
8	Screw for box completion	2

3.2. *Expansion port mounting for UR5i SL*

Attention! Expansion port XPORT include when the router UR5i SL is switch off.

After unscrewing four screws (position 10) on the rear panel (position 5) and removing it is possible to take out the B-UR-5i motherboard (position 1). The expansion port XPORT (position 2) is connected to connector J3 (see below) of the router B-UR-5 motherboard (position 1) from TOP side. The expansion port is mounted to the motherboard by the help of three spacers (position 9). After mounting the expansion port the box is screwed together by the help of four screws.



Parts list and description

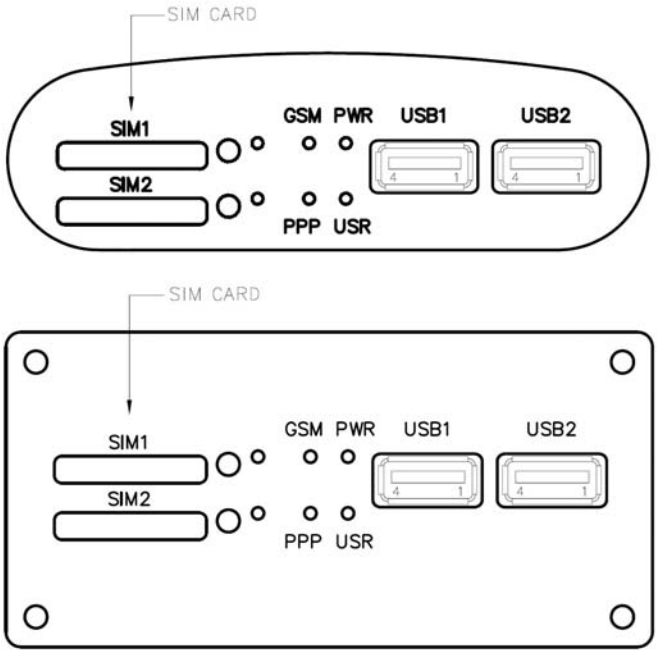
Part	Description	Number
1	UMTS router motherboard	1
2	Expansion port XPORT	1
3	Left box part	1
4	Right box part	1
5	Rear head	1
6	Front head	1
7	Bottom box part	1
8	Top box part	1
9	Spacers for expansion port XPORT mounting to motherboard	3
10	Screw for box completion	8

4. Change of the SIM cards

Attention! SIM cards include when the router is switch off.

The SIM cards change on the front panel:

Ensure that the router is disconnected from the power supply. Press the small yellow button next to the reader to eject the reader holder. Insert the SIM card into the reader holder and slide it in the reader.

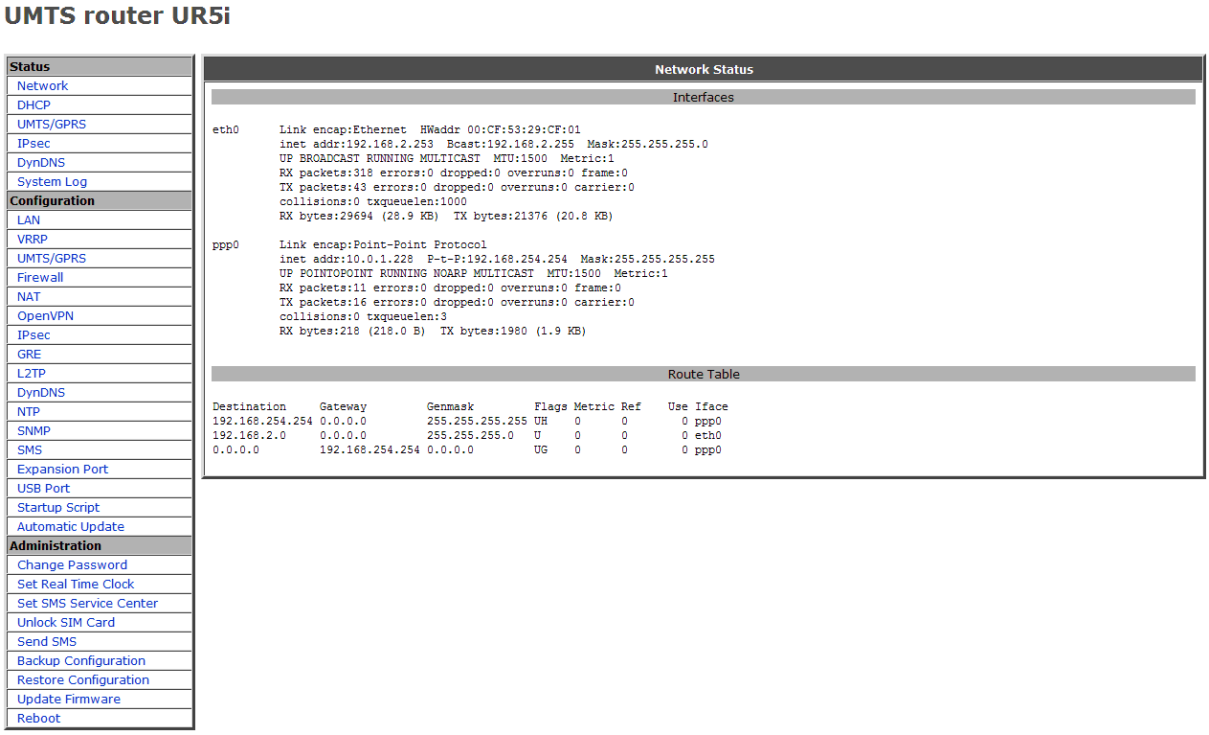


5. Configuration setting over web browser

Attention! If the SIM card is not inserted in the router, then it is impossible to operate. The inserted SIM card must have activated GPRS. Insert the SIM card when the router is switched-off.

Monitoring of the status, configuration and administration of the router can be performed by means of the web interface, which is available after insertion of IP address of the router into the web browser. The default IP address of the router is 192.168.1.1. Configuration may be performed only by the user "root" with initial password "root".

The left part of the web interface contains the menu with pages for monitoring of the Status, Configuration and Administration of the router.



After green LED starts to blink it is possible to restore initial settings of the router by pressing button RST, whereby is fulfilled the restoration of the configuration and reset (green LED will be on).

5.1. *Network Status*

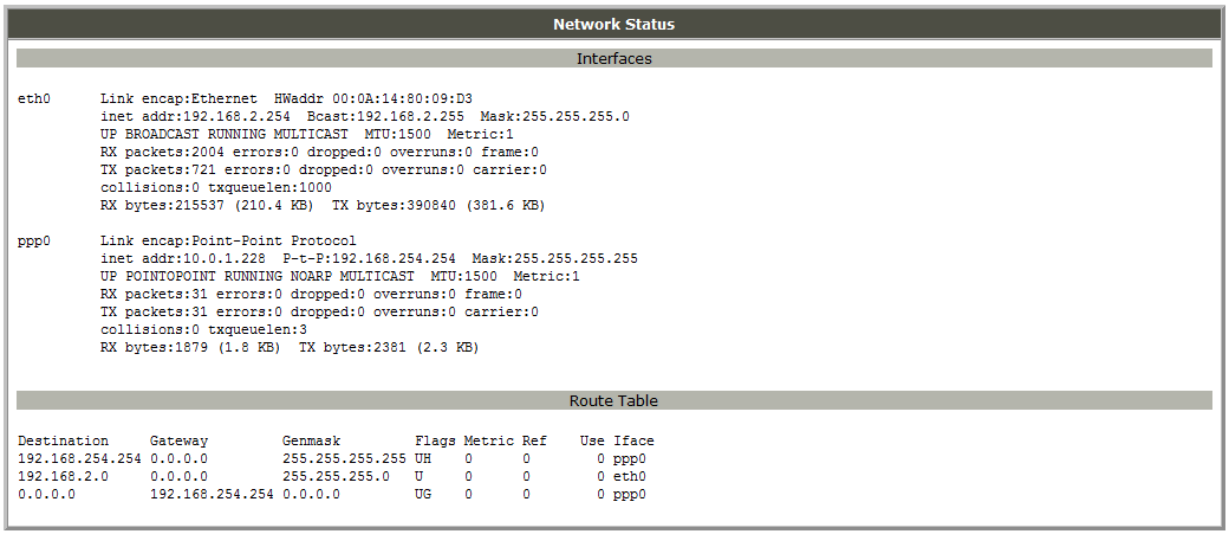
To view the system information about the router operation, select the *System Information* menu item. The bottom part of the window contains information about the system memory usage. The upper part of the window displays detailed information about active interfaces:

- eth0 – parameters of networks interface
- ppp0 – PPP interface (active connection to GPRS/EDGE)
- tun0 – OpenVPN tunnel interface
- gre1 – GRE tunnel interface
- ipsec0 – IPSec tunnel interface

By each of the interfaces are then shown the following information:

- HWaddr – hardware (unique) address of networks interface
- inet – own IP address
- P-t-P – IP address second ends connection
- Bcast – broadcast address
- Mask – mask of network
- MTU – maximal size of packet, which is equipment able transmit
- Metric – number of routers, over which packet must pass
- RX packets – received packets, errors – number of errors, dropped – dropped packets
- TX packets – transmit packets, errors – number of errors, dropped – dropped packets
- collisions – number of collisions
- RX bytes – total number of received bytes
- TX bytes – total number of transmit bytes

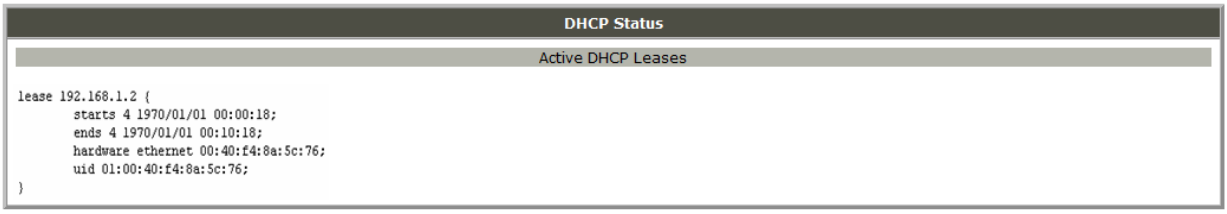
It is possible to elicit PPP connection state from the network information. If the PPP connection is active, then it is in the system information shown as ppp0 connection.


Network Status
Interfaces
eth0 Link encap:Ethernet HWaddr 00:0A:14:80:09:D3
inet addr:192.168.2.254 Bcast:192.168.2.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:2004 errors:0 dropped:0 overruns:0 frame:0
TX packets:721 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:215537 (210.4 KB) TX bytes:390840 (381.6 KB)
ppp0 Link encap:Point-Point Protocol
inet addr:10.0.1.228 P-t-P:192.168.254.254 Mask:255.255.255.255
UP POINTOPOINT RUNNING NOARP MULTICAST MTU:1500 Metric:1
RX packets:31 errors:0 dropped:0 overruns:0 frame:0
TX packets:31 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:3
RX bytes:1879 (1.8 KB) TX bytes:2381 (2.3 KB)
Route Table
Destination Gateway Genmask Flags Metric Ref Use Iface
192.168.254.254 0.0.0.0 255.255.255.255 UH 0 0 0 ppp0
192.168.2.0 0.0.0.0 255.255.255.0 U 0 0 0 eth0
0.0.0.0 192.168.254.254 0.0.0.0 UG 0 0 0 ppp0

5.2. *DHCP Status*

Information about IP addresses, which was leased to the router by the DHCP server, is possible to find in menu in sum *DHCP:*

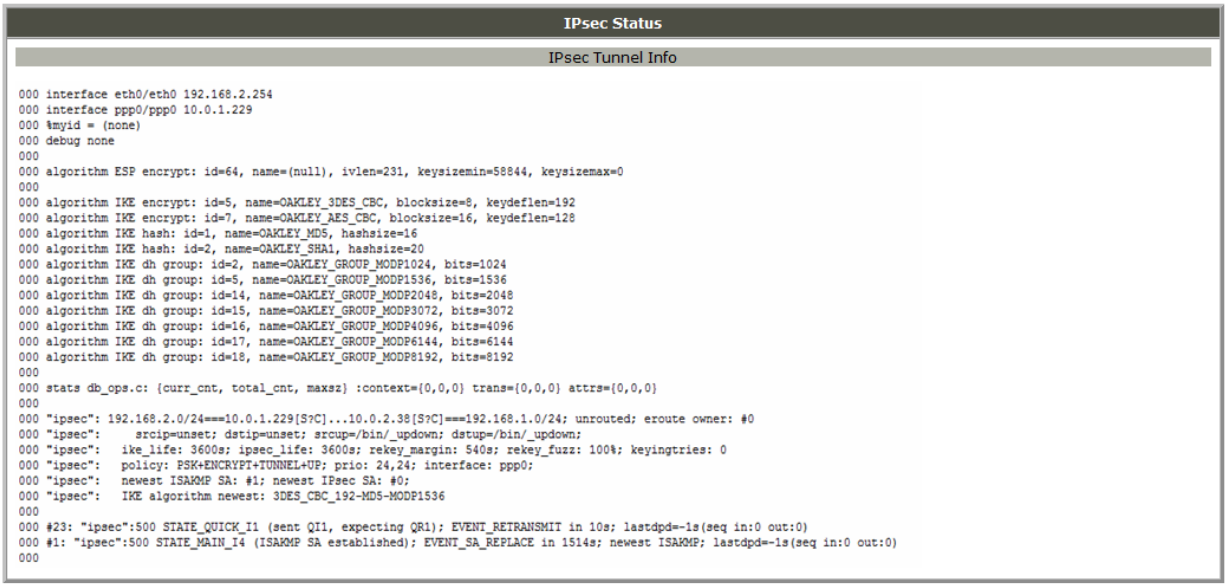
- lease 192.168.1.2 (generally IP address) – assigned IP address
- starts – information about time of assignation of IP address
- ends – information about time of termination IP address validity
- hardware ethernet – hardware MAC (unique) address
- uid – unique ID



In the extreme the DHCP status can display two records for one IP address. That could have been caused by resetting of network cards.

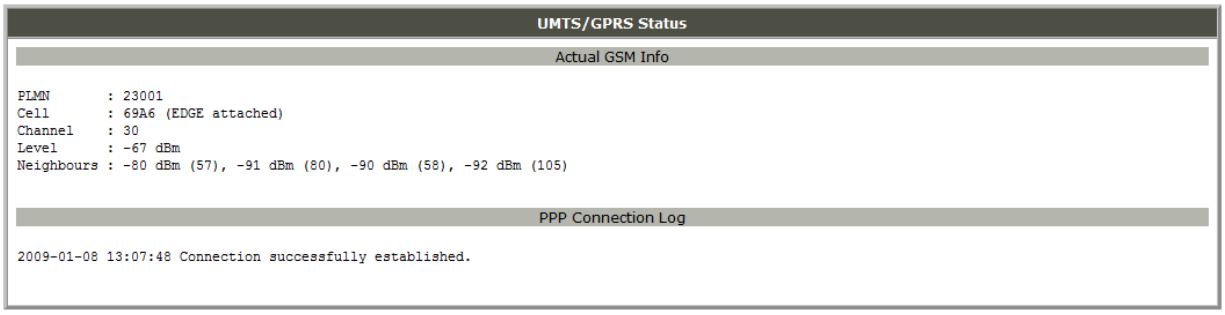
5.3. *IPsec status*

Information on actual IPsec tunnel state can be called up in option *IPsec* in the menu. Detailed information on the description shown below can be found on the following link http://www.freeswan.org/doc.html.


IPsec Status
IPsec Tunnel Info
000 interface eth0/eth0 192.168.2.254
000 interface ppp0/ppp0 10.0.1.229
000 %myid = (none)
000 debug none
000
000 algorithm ESP encrypt: id=64, name=(null), ivlen=231, keysizemin=58844, keysizemax=0
000
000 algorithm IKE encrypt: id=5, name=OAKLEY_3DES_CBC, blocksize=8, keydeflen=192
000 algorithm IKE encrypt: id=7, name=OAKLEY_AES_CBC, blocksize=16, keydeflen=128
000 algorithm IKE hash: id=1, name=OAKLEY_MD5, hashsize=16
000 algorithm IKE hash: id=2, name=OAKLEY_SHA1, hashsize=20
000 algorithm IKE dh group: id=2, name=OAKLEY_GROUP_MODP1024, bits=1024
000 algorithm IKE dh group: id=5, name=OAKLEY_GROUP_MODP1536, bits=1536
000 algorithm IKE dh group: id=14, name=OAKLEY_GROUP_MODP2048, bits=2048
000 algorithm IKE dh group: id=15, name=OAKLEY_GROUP_MODP3072, bits=3072
000 algorithm IKE dh group: id=16, name=OAKLEY_GROUP_MODP4096, bits=4096
000 algorithm IKE dh group: id=17, name=OAKLEY_GROUP_MODP6144, bits=6144
000 algorithm IKE dh group: id=18, name=OAKLEY_GROUP_MODP8192, bits=8192
000
000 stats db_ops.c: {curr_cnt, total_cnt, maxsz} :context={0,0,0} trans={0,0,0} attrs={0,0,0}
000
000 "ipsec": 192.168.2.0/24===10.0.1.229[S?C]...10.0.2.38[S?C]===192.168.1.0/24; unrouted; eroute owner: #0
000 "ipsec":   srcip=unset; dstip=unset; srcup=/bin/_updown; dstup=/bin/_updown;
000 "ipsec":   ike_life: 3600s; ipsec_life: 3600s; rekey_margin: 540s; rekey_fuzz: 100%; keyingtries: 0
000 "ipsec":   policy: PSK+ENCRYPT+TUNNEL+UP; prio: 24,24; interface: ppp0;
000 "ipsec":   newest ISAKMP SA: #1; newest IPsec SA: #0;
000 "ipsec":   IKE algorithm newest: 3DES_CBC_192-MD5-MODP1536
000
000 #23: "ipsec":500 STATE_QUICK_I1 (sent QI1, expecting QR1); EVENT_RETRANSMIT in 10s; lastdpd=-1s(seq in:0 out:0)
000 #1: "ipsec":500 STATE_MAIN_I4 (ISAKMP SA established); EVENT_SA_REPLACE in 1514s; newest ISAKMP; lastdpd=-1s(seq in:0 out:0)
000

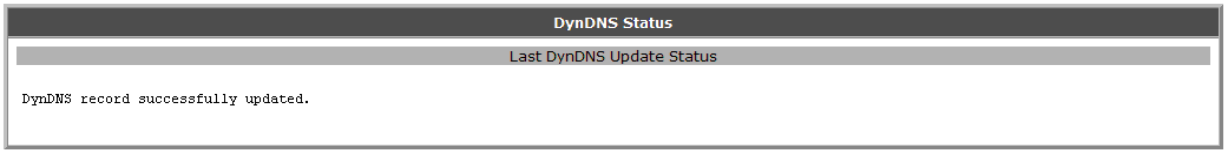
5.4. *UMTS/GPRS Status*

The item *UMTS* in the menu contains up-to-date information about PLMN (code of operator), cell, channel and signal quality of the selected cell, as well as neighboring hearing cells. The PPP Connection Log is in the bottom of this window where information about the make-up of the PPP connection is and pertinent problems on this formation.


UMTS/GPRS Status
Actual GSM Info
PLMN : 23001
Cell : 69A6 (EDGE attached)
Channel : 30
Level : -67 dBm
Neighbours : -80 dBm (57), -91 dBm (80), -90 dBm (58), -92 dBm (105)
PPP Connection Log
2009-01-08 13:07:48 Connection successfully established.

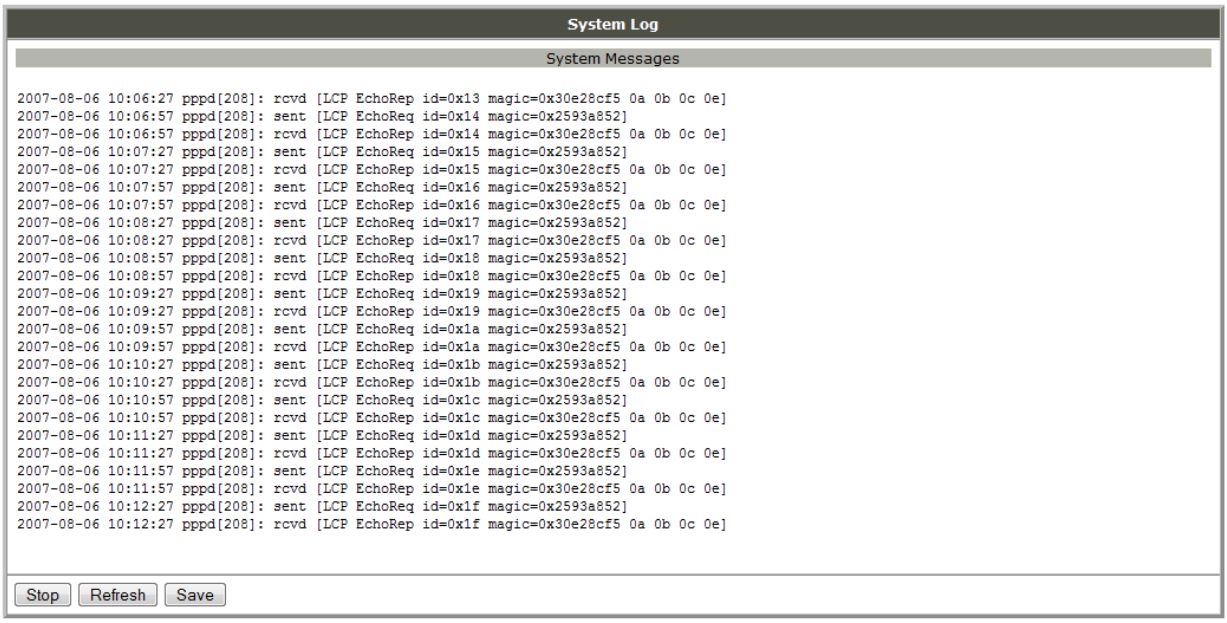
5.5. *DynDNS status*

DynDNS up - dating entry result on server www.dyndns.org can be called up in option DynDNS item in the menu.



5.6. *System Log*

In case of any problems with connection to GPRS it is possible to view the system log by pressing the *System Log* menu item. The System log observes only connection to GPRS and formation of IPsec tunnel. The upper part of the window displays possible errors at GPRS connection establishment. After switching on the log daemon by pressing the *Start* button, the bottom part of the window displays detailed reports from individual applications running in the router. To update the contents of the window press the *Refresh* button. By the help of button *Save* it is possible to save the system log to the computer.



5.7. *LAN Configuration*

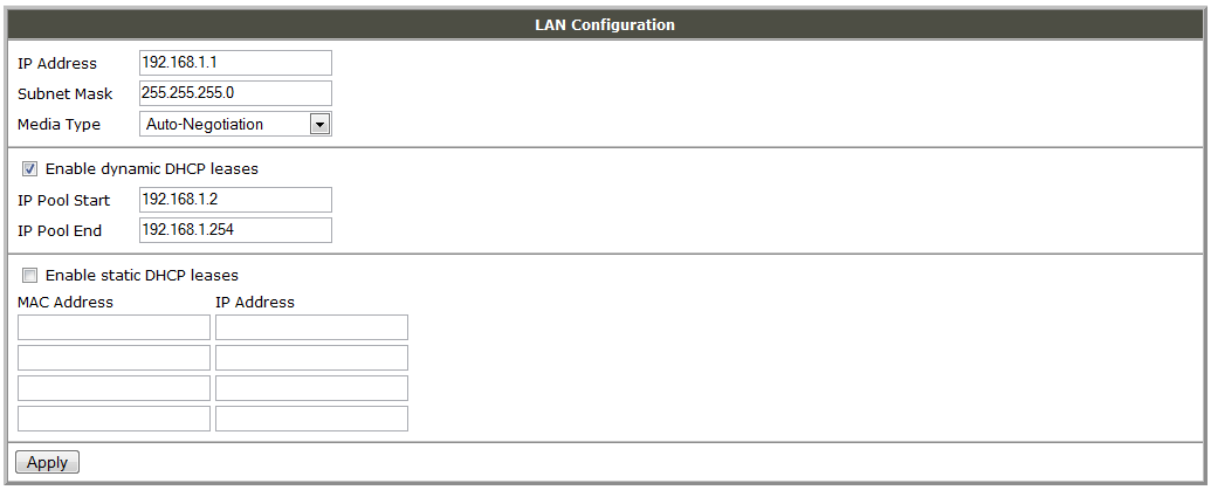
To enter the network configuration, select the *LAN* menu item. In the first part of the window it is possible to define the network interface IP address (*IP address*), the network mask (*Subnet Mask*) and media type (*Media Type*), in the majority of cases set *Auto-Negotiation*.

In the second part of the window, it is possible to define the DHCP server by checking the *Enable dynamic DHCP server* option. In the window it is possible to define the beginning (*IP Pool Start*) and end (*IP Pool End*) of the pool of IP addresses which will lease to DHCP clients.

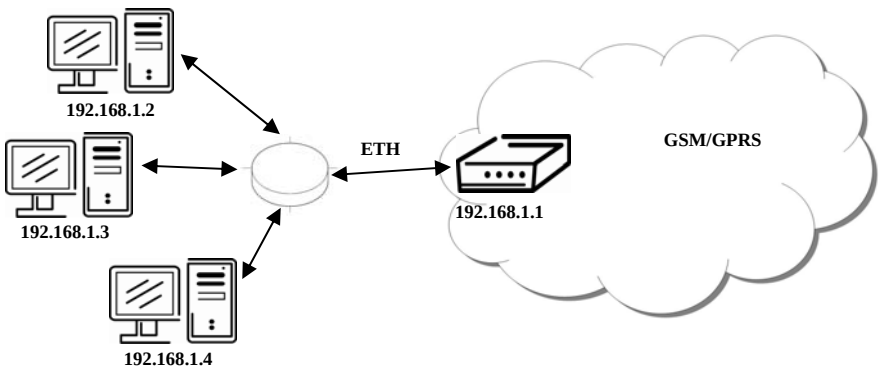
In the third part of the Windows it is possible, by checking the *Enable static DHCP server* option, to define leases up to four static *IP Addresses*, which conform to *MAC Address* of the connected equipment etc.

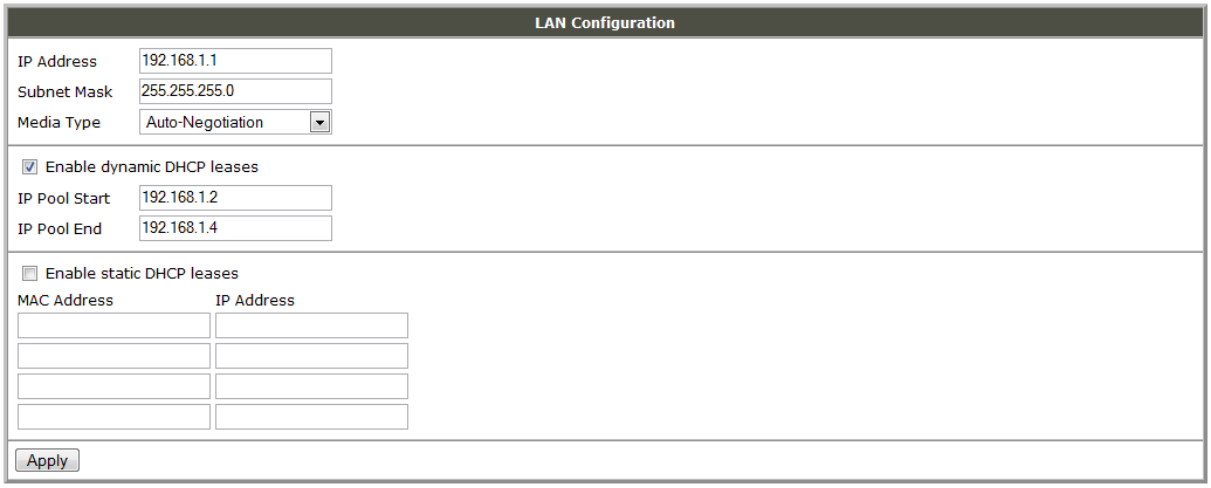
The changes in settings will apply after pressing the *Apply* button.

The DHCP server assign IP addresses to the connected clients from defined address pool, IP address of the gate and IP address of the primary DNS server. It is important not to overlap ranges of static engaged IP address with address allotted by the help of DHCP, or collision of addresses may occur, thereby malfunctioning the network.

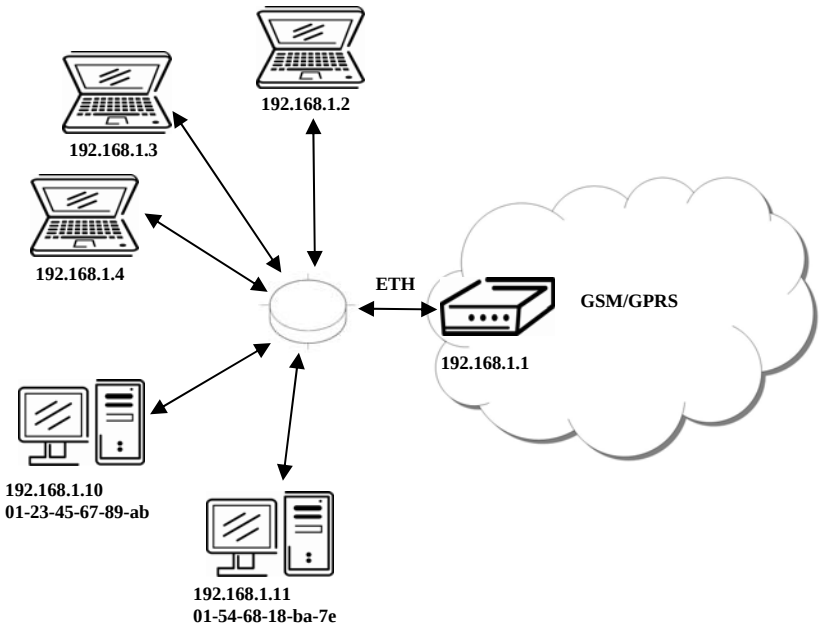


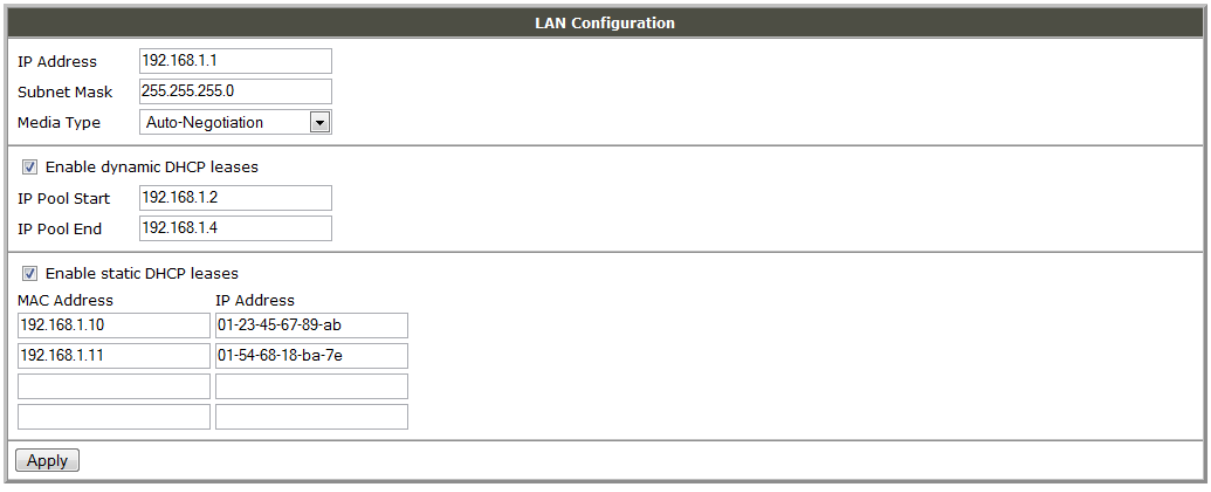
Example of the network interface with dynamic DHCP server:





Example of the network interface with dynamic and static DHCP server:

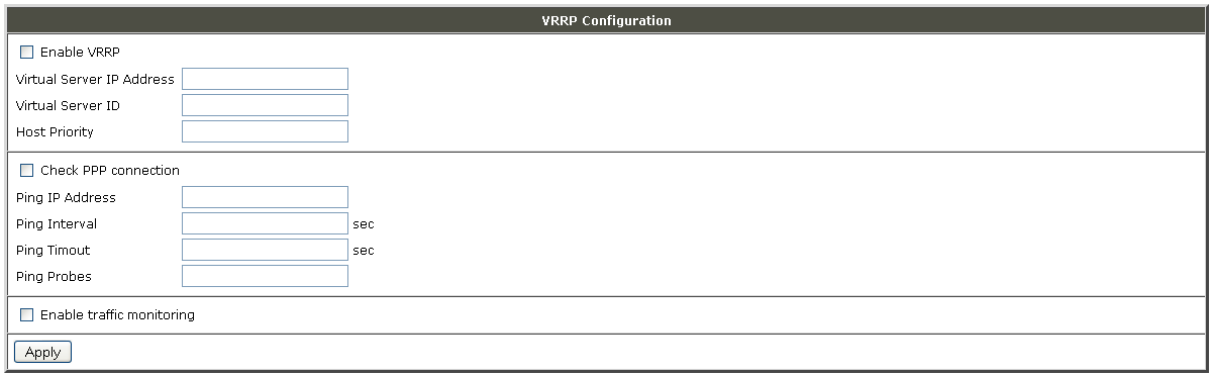




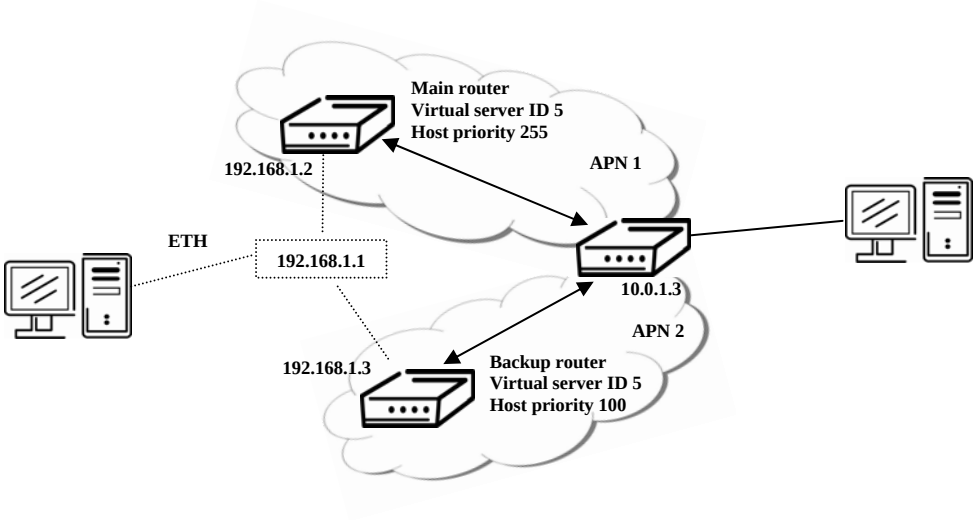
5.8. *VRRP Configuration*

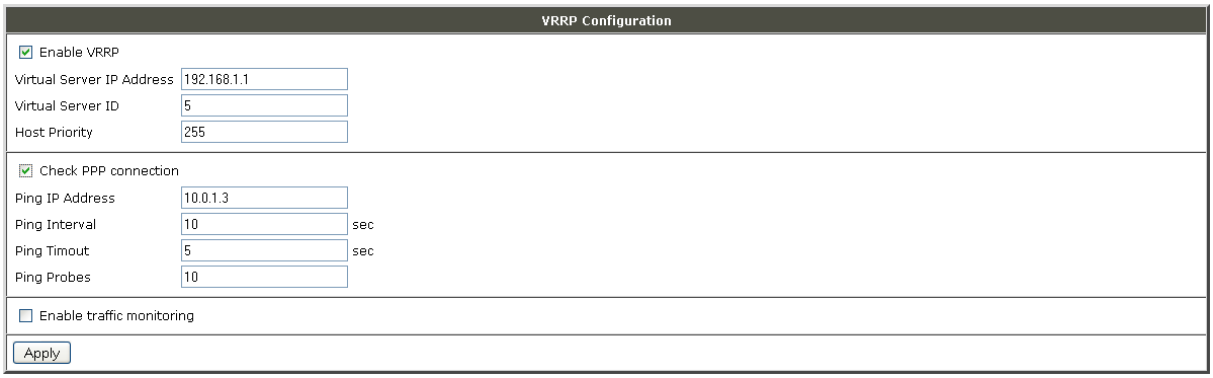
To enter the VRRP configuration select the *VRRP* menu item. VRRP protocol (Virtual Router Redundancy Protocol) is a technique, by which it is possible to forward routing from main router to backup router in the case of the main router failure. If the *Enable VRRP* is checked, then it is possible to set the following parameters. Parameter *Virtual Server IP Address* sets virtual server IP address. This address should be the same for both routers. a connected device sends its data via this virtual address. Parameter *Virtual Server ID* distinguishes one virtual router on the network from others. This implies that the main and backup routers must use the same value for this parameter. The router, with higher priority set by the parameter *Host Priority*, is the main router. According to RFC 2338 the main router has the highest possible priority - 255. The backup router has priority in range 1 – 254 (init value is 100). The priority value equals 0 is not allowed.

It is possible to set *Check PPP connection flag* in the second part of the window. The currently active router (either main or backup) will send testing messages to defined *Ping IP Address* at periodic time intervals (*Ping Interval)* with setting time of waiting for answer (*Ping Timeout)*. The function check PPP connection is used as a supplement of VRRP standard with the same final result. If there are no answers from remote devices (*Ping IP Address*) for a defined number of probes (*Ping Probes),* then connection is switched to the other line. It is possible to use for example a DNS server of mobile operator as a test message (ping) IP address. There's an additional way for evaluating the state of the active line. It is activated by selecting *Enable traffic monitoring* parameter. If this parameter is set and any packet different from ping is sent to the monitored line, then any answer to this packet is expected for *Ping Timeout*. If *Ping Timeout* expires with no answer received then process of testing the active line continues the same way like in the case of standard testing process after first test message answer drops out.



Example of the VRRP protocol:





5.9. *UMTS/GPRS Configuration*

To enter the GPRS connection configuration select the *GPRS* menu item. If the *Create GPRS connection* option is selected, the router automatically tries to establish GPRS connection after switching-on. In this window it is possible to define *Username*, *Password* and *IP address* for two different *APN*. If the *IP address* field is not filled in, the operator automatically assigns the IP address when it is establishing the connection.

If the *APN* field is not filled in, then router automatically selects the APN by the IMSI code of the SIM card. If the PLMN (operator number format) is not in the list of APN, then default APN is “internet“. The mobile operator defines APN. The PLMN parameter is possible to define in *Operator* item. *Network Type* item defines way of data transmition, respectively *Automatic selection* according to network availability or *UMTS/HSDPA* or *GPRS/EDGE* technology. By parameter *PIN* it is possible to put PIN to the SIM card always during the starting of the router.

Attention! If one SIM card is inserted into the router, which has two different APN’s, the router cannot have the second SIM socket mounted. Otherwise it will switch to secondary APN false. Also, correct PIN must be filled. For SIM cards with two APN’s there will be the same PIN for both APN`s. Otherwise the SIM card can be blocked by false SIM PIN.

The choice *Get DNS address from operator* is given for easier configuration on client side. If this field is filled in, then the router tries to get an IP address of primary and secondary DNS server from the operator automatically.

If the *Check PPP connection* option is selected, it has active control of connection over PPP. The router will automatically send the ping question to the selected IP address (*Ping IP Address*) in periodic time intervals (*Ping Interval*). After three unsuccessfully pings on appropriate IP address the router terminates connection and tries to establish a new connection. It is possible to use, for example, the DNS server of a mobile operator as the ping IP address.

If the *Enable Traffic Monitoring* option is selected, then the router stops sending ping questions to the *Ping IP Address* and it will watch traffic in PPP connection. If PPP connection is without traffic longer than the *Ping Interval,* then the router sends ping questions to the Ping IP Address.

Parameter *Data limit* set limit for sending via GPRS. By the parameter *Accounting Start* it is possible to specify after which amount of data will start accounting defined in *Data limit*. If the parameter *Switch to backup SIM card when data limit is exceeded* (see next) or *Send SMS when datalimit is exceeded* (see SMS configuration) are not selected the data limit will not count.

Parameter *Warning Threshold* determine per cent of *Data Limit*, which if is exceeded, then the router sends an SMS in the form router has exceeded (value of *Warning Threshold*) of data limit.

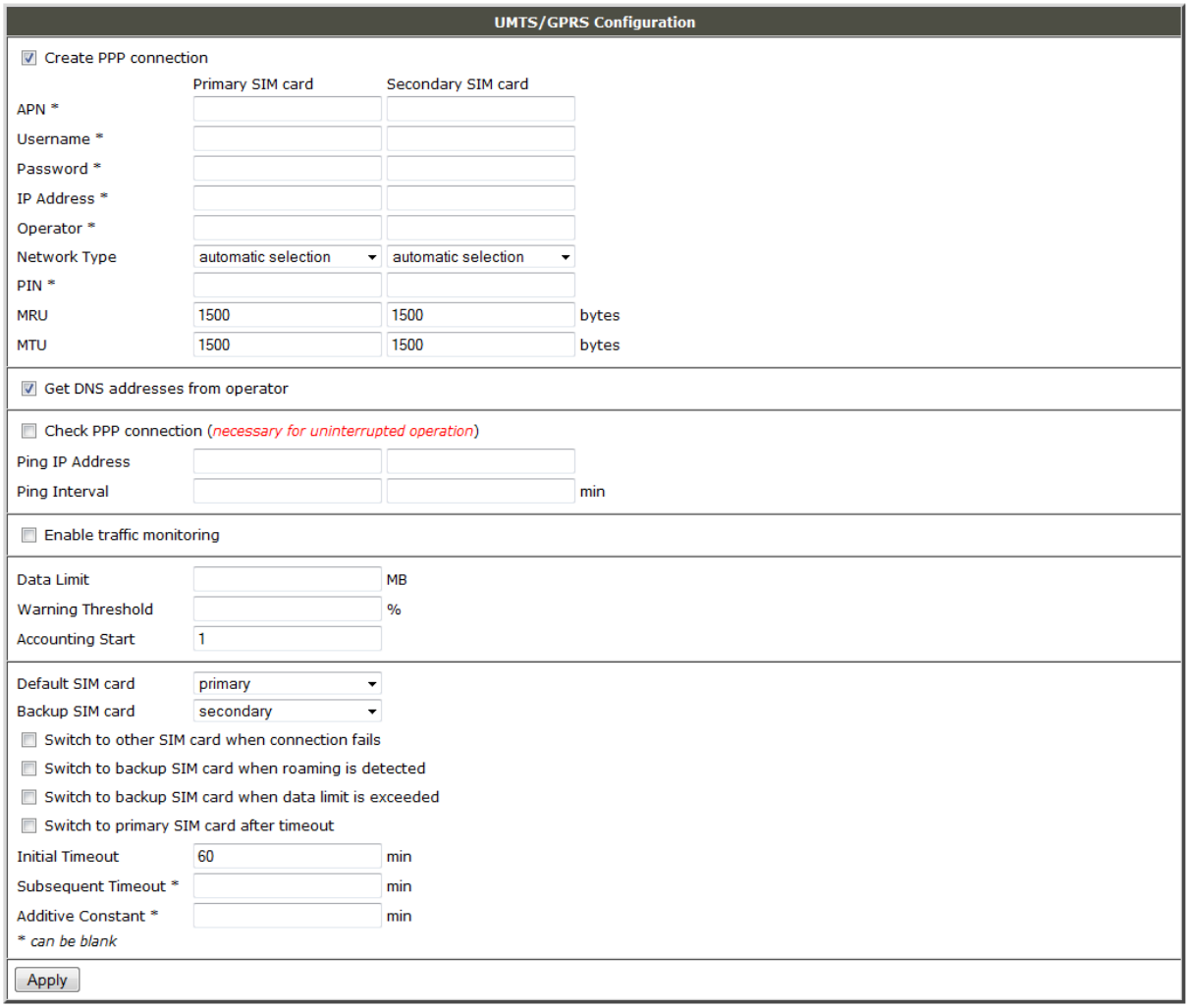
At the bottom of configuration it is possible to set rules for switching between two APN's on the SIM card, in the event that one SIM card is inserted or between two SIM cards, in the event that two SIM cards are inserted. Parameter *Default SIM card* sets default APN or SIM card, from which it will try to establish the PPP connection. If this parameter is set to *none,* the router launches in off-line mode and it is necessary to establish PPP connection via SMS message. If PPP connection fails, then the parameter *Switch to other SIM card when connection fails* ensures switch to secondary SIM card or secondary APN of the SIM card. In case that the roaming is detected the parameter *Switch to backup SIM card when roaming is detected* enables switching to secondary SIM card or secondary APN of the SIM card. Parameter *Switch to backup SIM card when data limit is exceeded* enables switching to secondary SIM card or secondary APN of the SIM card, when the data limit of default APN is exceeded. Parameter *Switch to primary SIM card after timeout* defines conditions, how to switch back to the default SIM card or default APN. Parameter *Switch to primary SIM card after timeout* enable defines the method, how the router will try to switch back to default SIM card or default APN.

If parameter Backup SIM card is set to none, then parameters *Switch to other SIM card when connection fails, Switch to backup SIM card when roaming is detected and Switch to backup SIM card when data limit is exceeded* switch the router to off-line mode.

Parameter *Initial Timeout* sets the time after which the Router tries to make connection with default APN, range of this parameter is from 1 to 10000 minutes. Parameter *Subsequent Timeout* sets the time period for every other next attempt to make connection with default APN, range is from 1 to 10000 minutes. Parameter *Additive Constant* sets the amount of time which is added to every attempt at main connection establishment after unsuccessful defined attempt (for example: after a second unsuccessful attempt at main connection establishment time of next attempt is extended by about 30 minutes etc.). Range is from 1 to 1000 minutes.

Attention! We recommend checking the GPRS connection in case of uninterrupted running.

The changes in settings will apply after pressing the *Apply* button.



Annotation:

- MTU (Maximum Transmission Unit) – it is the identifier of the maximum size of packet, which is possible to transfer in a given environment.
- MRU (Maximum Receiving Unit) – it is the identifier of the maximum size of packet, which is possible to receive in a given environment.

Default value is 1500 bytes. Other settings may cause incorrect transmission of data.

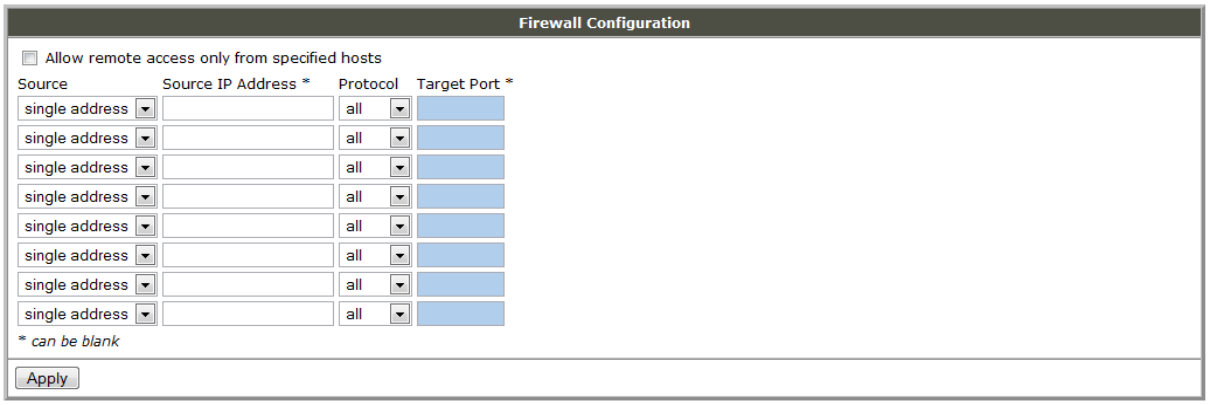
5.10. *Firewall Configuration*

By the help of a firewall it is possible to set IP addresses from which are possible to remotely access the router. The choice *Allow remote access only from specified hosts* is given for easier configuration of hosts. In this firewall configuration it is possible to set up to four remote accesses by the help of *Source*, *Source IP Address*, *Protocol* and *Target Port*.

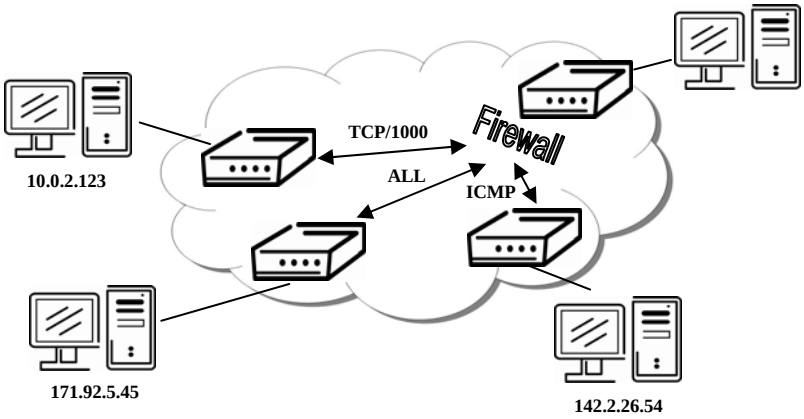
Parameter *Source* defines if access is allowed to one IP address which is defined by *Source IP Address*, or every IP addresses. In menu *Protocol* it is possible to specify protocol for remote access, it is possible to allow all protocols (*all*), or only one protocol *UDP*, *TCP* or *ICMP*. By parameter *Target Port* it is possible to specify a port number.

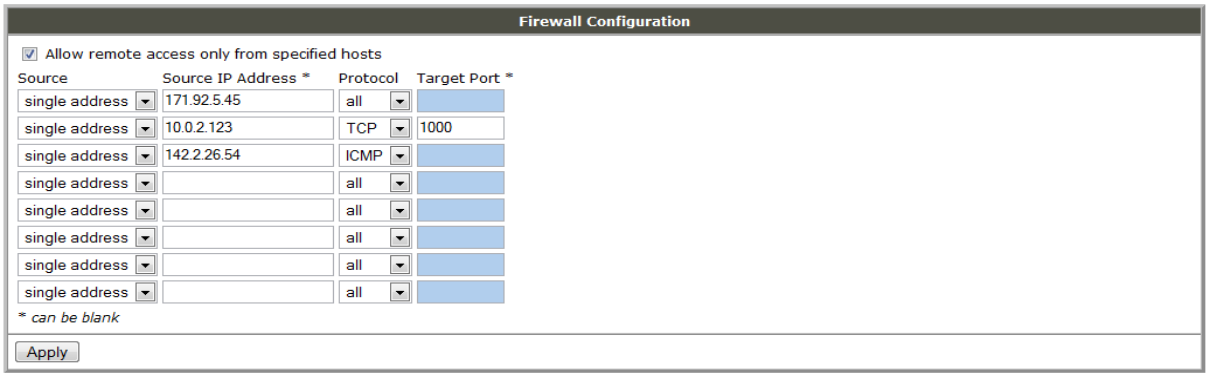
The changes in settings will apply after pressing the *Apply* button.

Caution! Firewall doesn't filter via Ethernet.



Example of the firewall configuration:





5.11. *NAT Configuration*

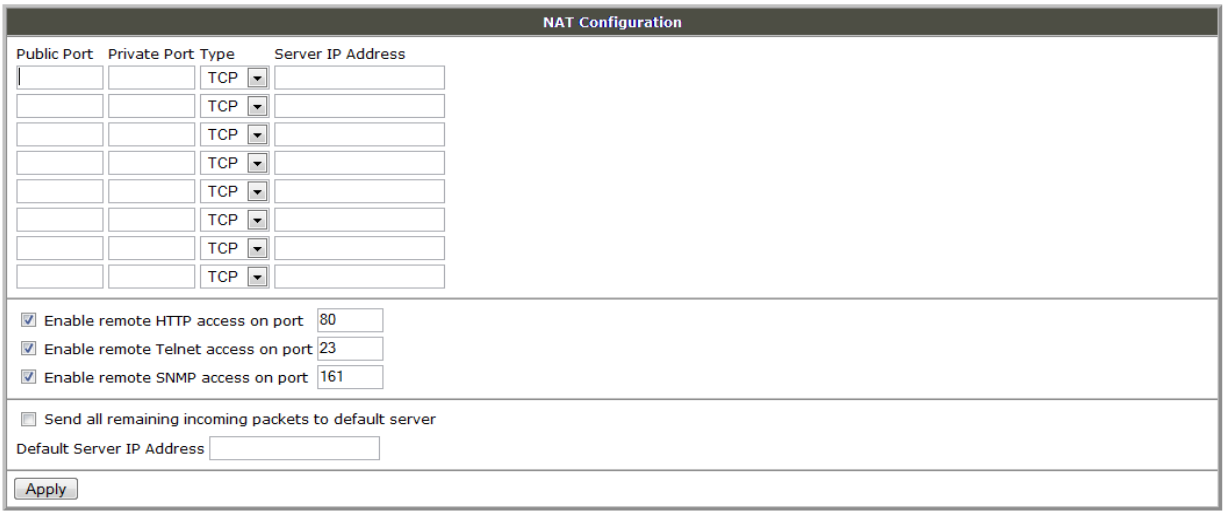
To enter the Network Address Translation configuration, select the *NAT* menu item. By checking off the *Send all incoming packets to default server* item and setting the *Default Server* item it is possible to put the router into the mode in which all incoming data from GPRS will be routed to the computer with the defined IP address.

If the *Enable remote HTTP access* field and port number is filled in, then configuration of the router over web interface is possible.

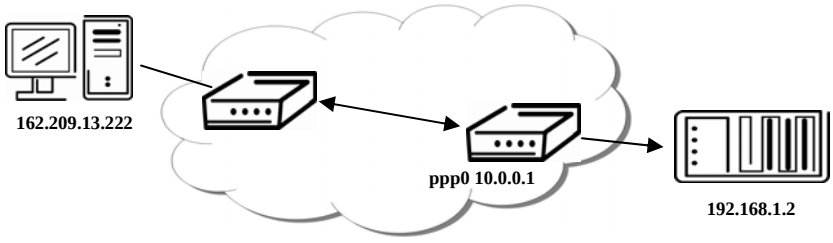
Choice *Enable remote Telnet access* and port number makes it possible to access over Telnet.

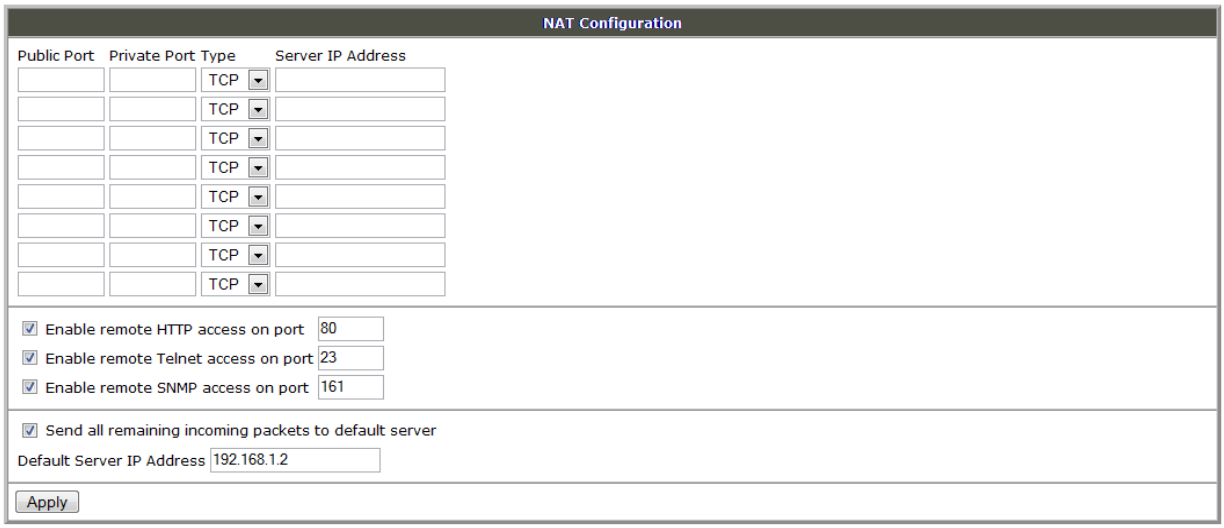
Choice *Enable remote SNMP access* and port number makes it possible to access to SNMP agent.

The changes in settings will apply after pressing the *Apply* button.



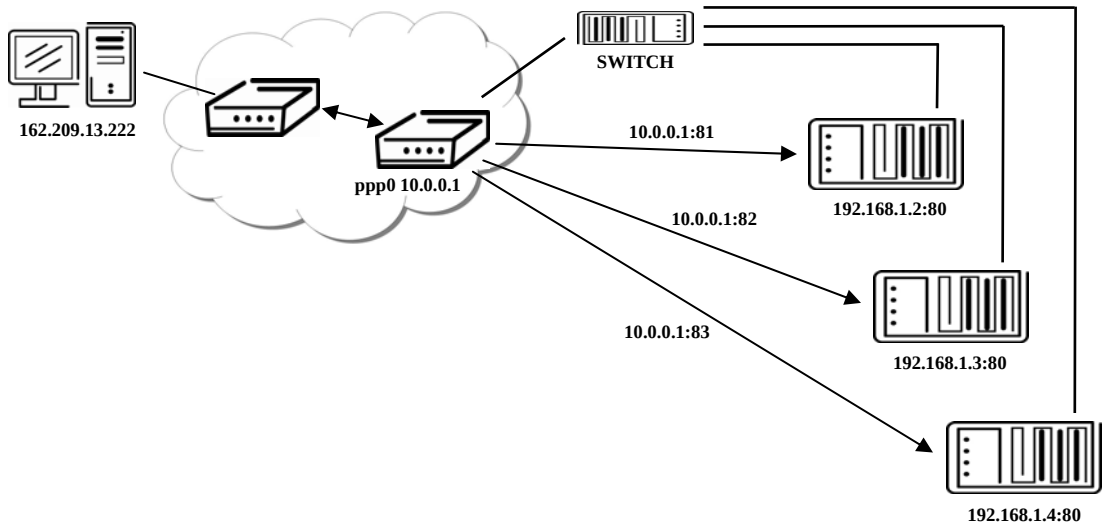
Example of the configuration with one connection equipment on the router:

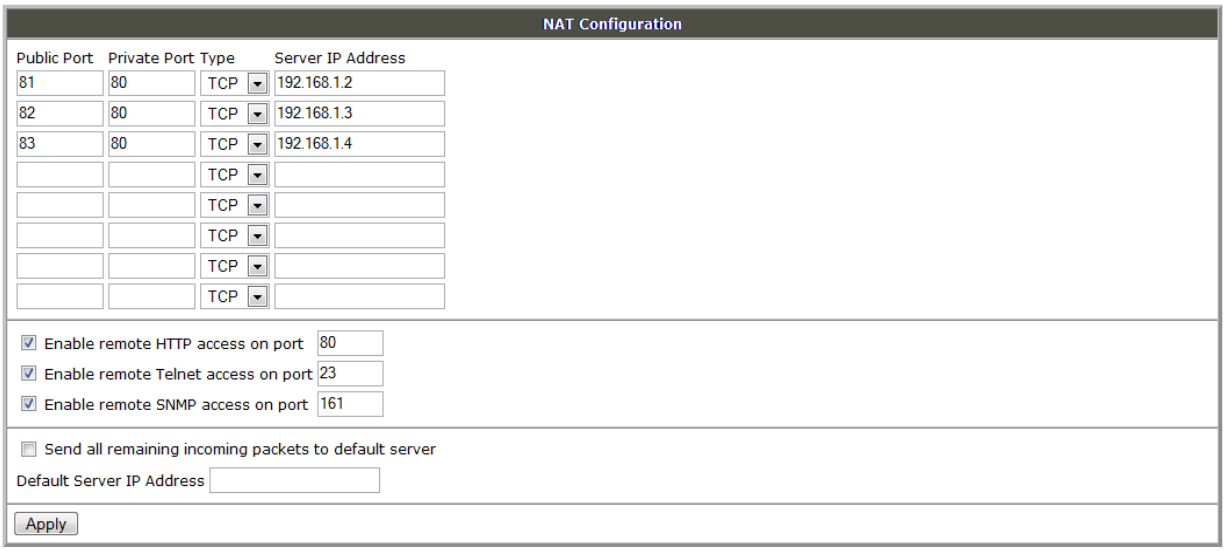




In these configurations it is important to have marked choice of *Send all remaining incoming packets it default server*, IP address in this case is the address of the device behind the router. Connected equipment behind the router must have set Default Gateway on the router. Connected device replies, while PING on IP address of SIM card.

Example of the configuration with more connected equipment:





In this configuration equipment wired behind the router defines the address *Server IP Address*. The router replies, while PING on address of SIM card. Access on web interface of the equipment behind the router is possible by the help of Port Forwarding, when behind IP address of SIM is indicating public port of equipment on which we want to come up. At demand on port 80 it is surveyed singles outer ports (Public port), there this port isn't defined, therefore at check selection Enable remote http access it automatically opens the web interface router. If this choice isn't selected and is selected volition Send all remaining incoming packets to the default server fulfill oneself connection on induction IP address. If it is not selected election Send all remaining incoming packets to default server and Default server IP address then connection requests a failure. If it is necessary to set more than 8 rules for NAT, then it is possible to insert into start up script following script.

If necessary set more than 8 rules for NAT, then is possible insert into start up script following script:

iptables -t nat -A napt -p tcp --dport [PORT_PUBLIC] -j DNAT --to-destination [IPADDR]:[PORT1_PRIVATE]

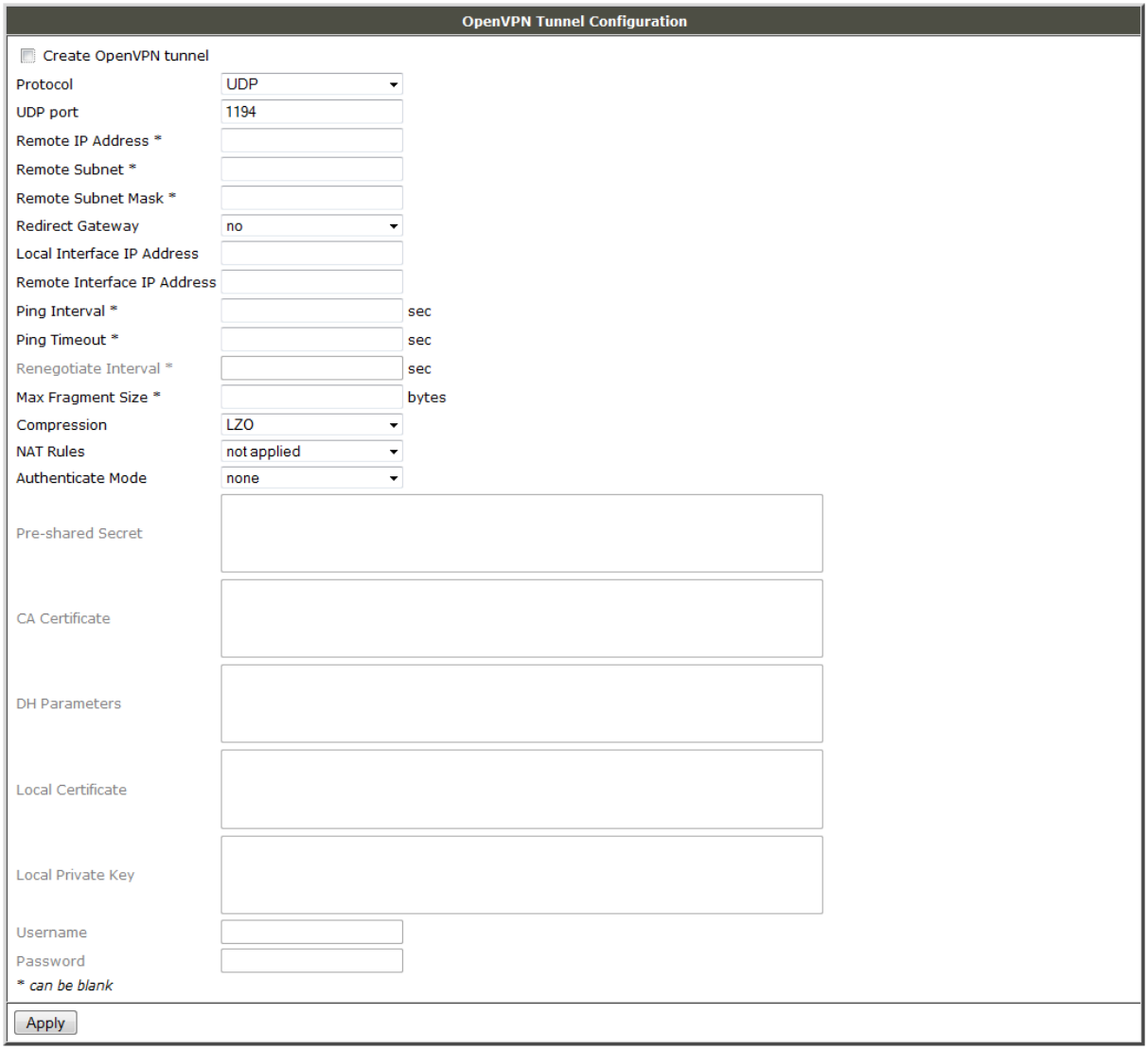
Concrete IP address [IPADDR] and ports numbers [PORT_PUBLIC] and [PORT1_PRIVATE] are filled up into square bracket.

5.12. *OpenVPN Tunnel Configuration*

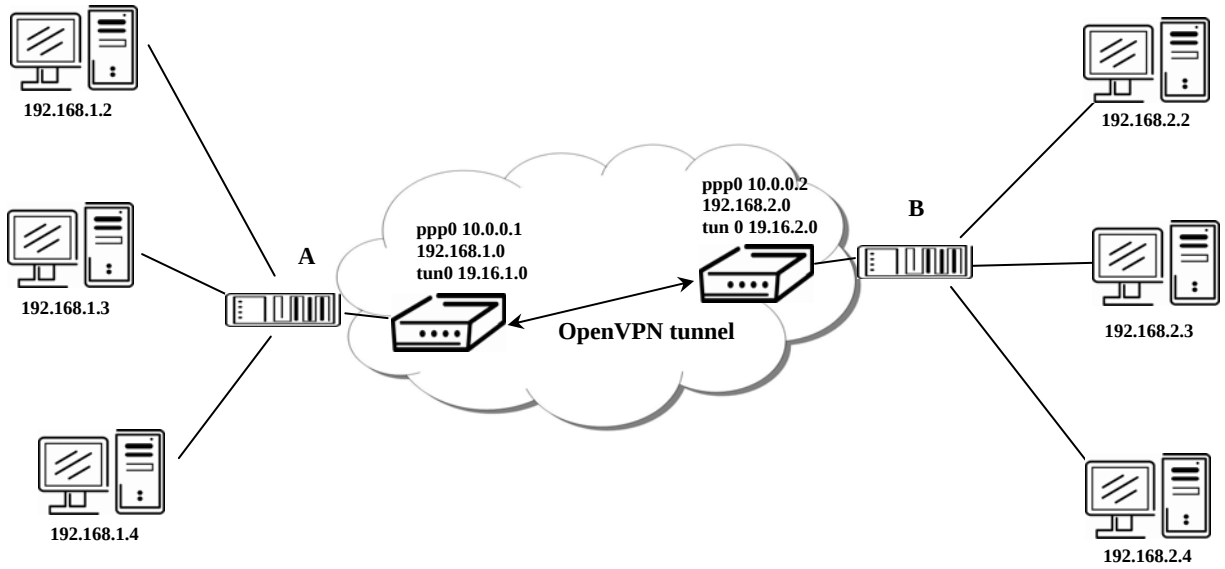
OpenVPN tunnel configuration can be called up in option *OpenVPN* item in the menu. The OpenVPN tunnel enables secured connection of two LAN networks to one homogenous. Choice *Create OpenVPN tunnel* makes it possible to create a tunnel.

In the window can be defined *Protocol*, by which the tunnel will communicate. At choice is *UDP*, *TCP server* or *TCP client* protocol which has to have defined *port* protocol. On off - side tunnel IP address (*Remote External IP Address*), address nets behind off - side tunnel (*Remote Subnet*), mask nets behind off - side tunnel (*Remote Subnet Mask*). By parameter Redirect Gateway is possible to redirect all traffic on Ethernet. Parameter *Local Interface IP Address* defines local interface IP address, parameter *Remote Interface IP Address* defines the interface IP address of the off-side tunnel. Parameter *Ping Interval* defines the time period after which it sends a message to off-side and by parameter *Ping Timeout* waits on message from off-side tunnel. For OpenVPN tunnel right verify parameter *Ping Timeout* has to be bigger than *Ping Interval*. Parameter *Renegotiate Interval* sets

renegotiate period (reauthorization) of the OpenVPN tunnel. This parameter is possible to set only at username/password authentication or at X.509 certificate using. By parameter *Max Fragment Size* it is possible to define maximum sending packet size. Sending data is possible compress by lossless LZO compressions by parameter Compression, compression has to be on both tunnel ends. By parameter *NAT Rules* it is possible to apply set NAT rules to OpenVPN tunnel. By *Authenticate Mode* it is possible to choose authentication. On choice are *none* authentication, or by *Pre-shared secret* which set shared key for both off-side tunnel; or by *Username/Password* which enable authentication by *CA Certificate*, *Username* and *Password*; next can be *X.509 Certificate (client)*, this enables authentication by *CA Certificate*, *Local Certificate* and *Local Private Key*; last possibility is *X.509 Certificate (server)* which enables authentication by *CA Certificate*, *DH Parameters*, *Local Certificate* and *Local Private Key*.



Example of the OpenVPN tunnel configuration:

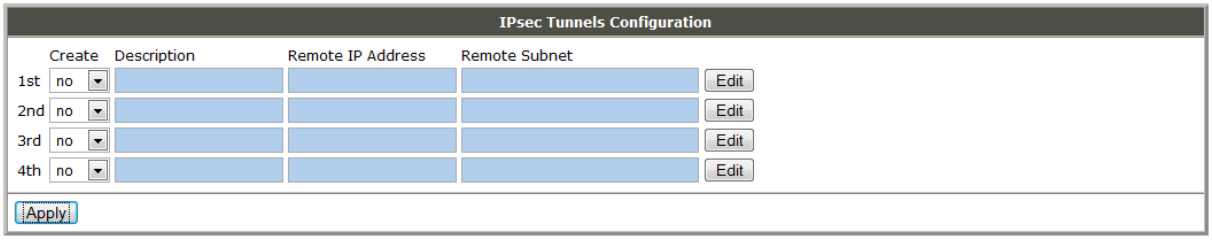


OpenVPN tunnel configuration:

	A	B
Protocol	UDP	UDP
UDP Port	1194	1194
Remote IP Address:	10.0.0.2	10.0.0.1
Remote Subnet:	192.168.2.0	192.168.1.0
Remote Subnet Mask:	255.255.255.0	255.255.255.0
Local Interface IP Address:	19.16.1.0	19.16.2.0
Remote Interface IP Address:	19.16.2.0	19.18.1.0
Compression	LZO	LZO
Authenticate mode:	none	none

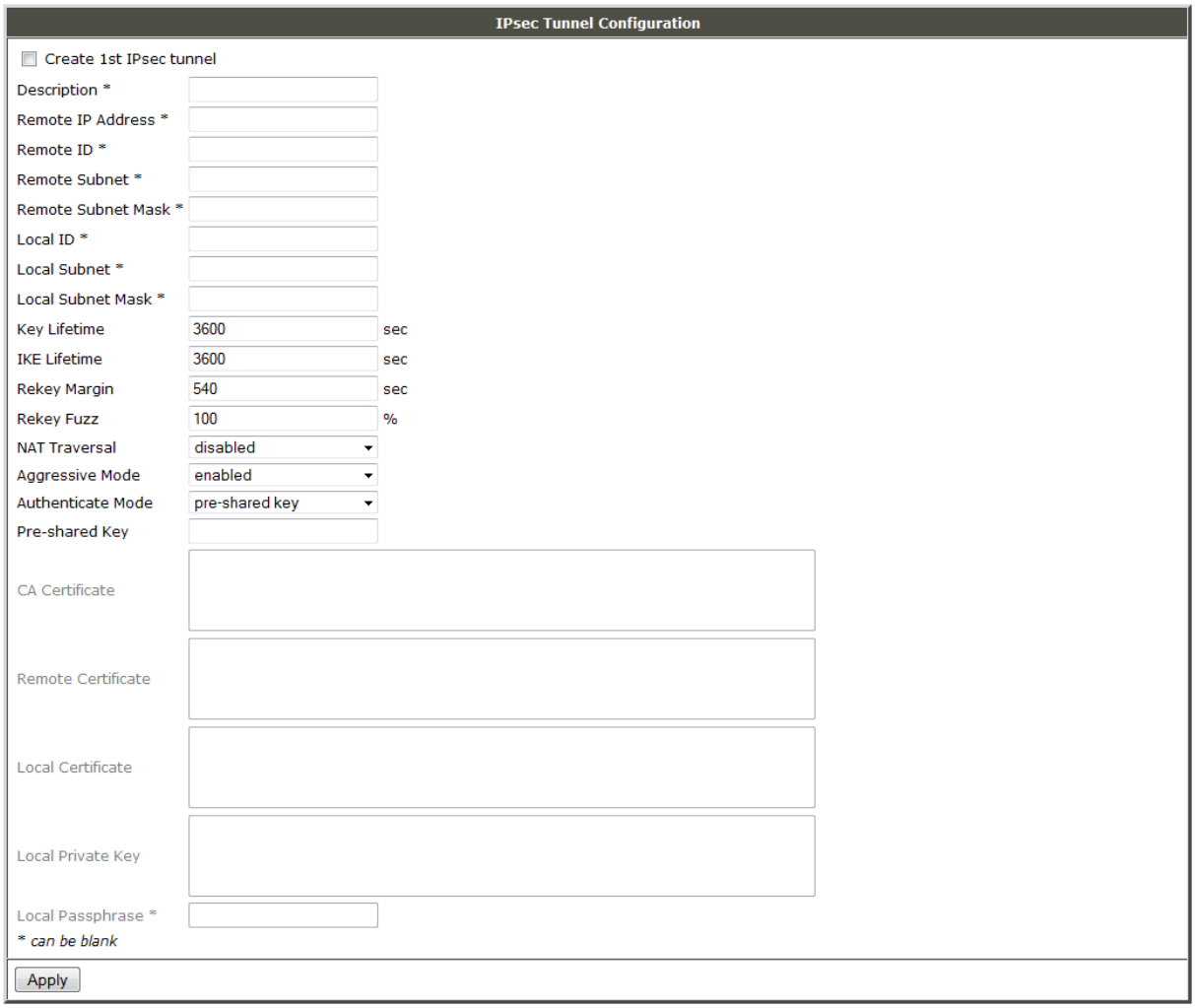
5.13. *IPSec Tunnel Configuration*

IPsec tunnel configuration can be called up by option *IPsec* item in the menu. IPsec tunnel allows protected connection of two networks LAN to the one which looks like one homogenous. In the *IPsec Tunnels Configuration* window are four rows, each row for one configured IPSec tunnel. The column *Create* switches on tunnels, other columns contain values view set in the *IPsec Tunnel Configuration* windows; configuration is possible by the *Edit* button.

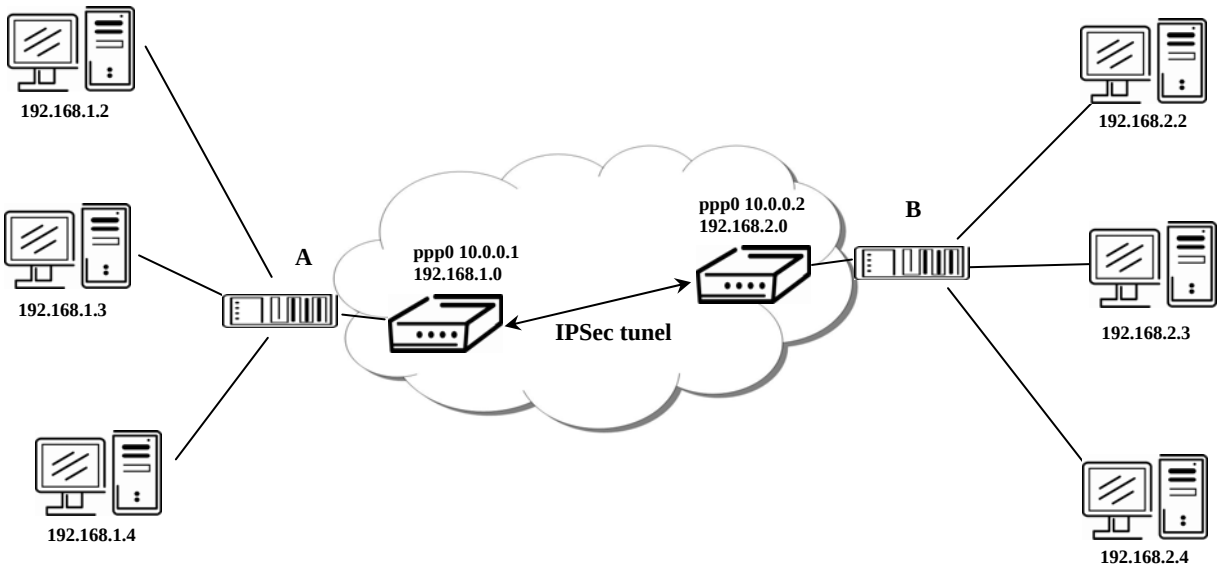


In the *IPsec Tunnel Configuration* windows it is possible to define the tunnel name (Description), off - side tunnel IP address (*Remote IP Address*), identification of off-side tunnel (*Remote ID*), address nets behind off - side tunnel (*Remote Subnet*), mask nets behind off - side tunnel (*Remote Subnet Mask*), identification of local side (*Local ID*), local subnet address (*Local Subnet*), local network mask (*Local Subnet Mask*), sharable key for both parties tunnel (*Pre shared Key*), service life keys (*Key Lifetime*) and service life IKA SA (*IKE Lifetime*). *Rekey Margin* specifies how long before connection expiry should attempt to negotiate a replacement begin. *Rekey Fuzz* specifies the maximum percentage by which *Rekey Margin* should be randomly increased to randomize re-keying intervals. If address translation between two end points of the IPsec tunnel is used, it needs to allow NAT Traversal (*Enabled*). If parameter *Aggressive mode* is enabled, then establishing of IPsec tunnel will be faster, but encryption will set permanently on 3DES-MD5. Authentication is possible to set by parameter *Authenticate mode*, at choice are following possibilities: *Pre-shared key* or *X.509 Certificate*. Parameter *Pre-shared Key* set shared key for both off-side tunnel. At authentication by X.509 certificate it is necessary put in certificates *CA Certificate*, *Remote Certificate* and *Local Certificate* and private key *Local Private Key* and *Local Passphrase*. The certificates and private keys have to be in PEM format. As certificate it is possible to use only certificate which has start and stop tag certificate. Parameters ID contain two parts: *hostname* and *domain-name*. Items which can be blank, are used for to exact IPsec tunnel identification.

The changes in settings will apply after pressing the *Apply* button.



Example of the IPSec Tunnel configuration:

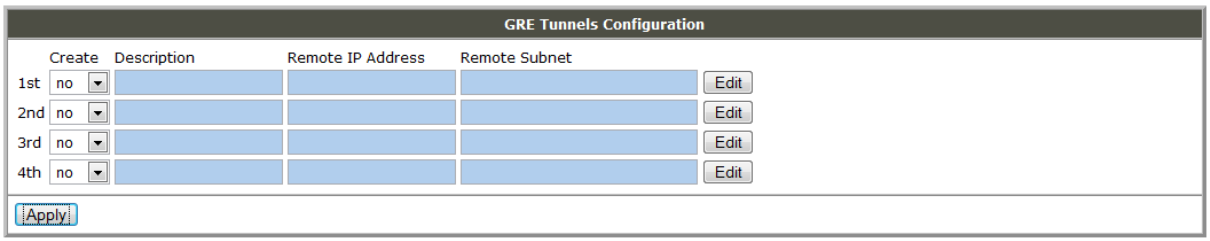


IPsec tunnel configuration:

	A	B
Remote IP Address:	10.0.0.2	10.0.0.1
Remote Subnet:	192.168.2.0	192.168.1.0
Remote Subnet Mask:	255.255.255.0	255.255.255.0
Local Subnet:	192.168.1.0	192.168.2.0
Local Subnet Mask:	255.255.255.0	255.255.255.0
Authenticate mode:	pre-shared key	pre-shared key
Pre-shared key	test	test

5.14. *GRE Tunnels Configuration*

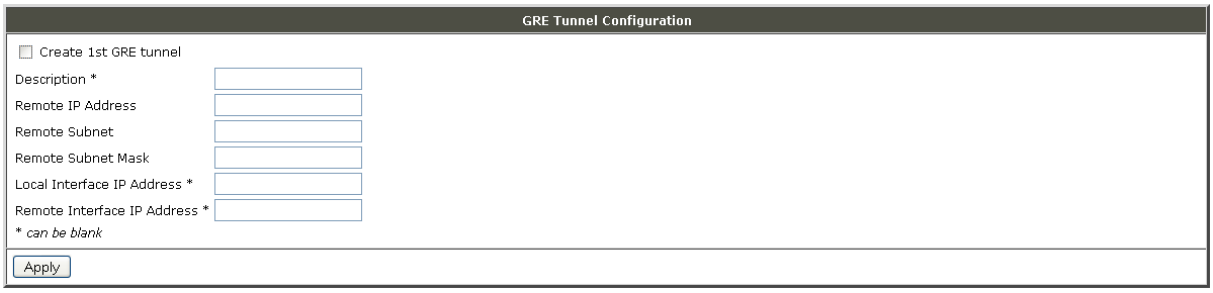
To enter the GRE tunnels configuration, select the *GRE* menu item. It is possible configure up to four GRE tunnels. In the *GRE Tunnels Configuration* window are four rows, each row for one configured GRE tunnel. The column *Create* switch on tunnels, other columns contain values view set in the *GRE Tunnel Configuration* windows; configuration is possible by *Edit* button.



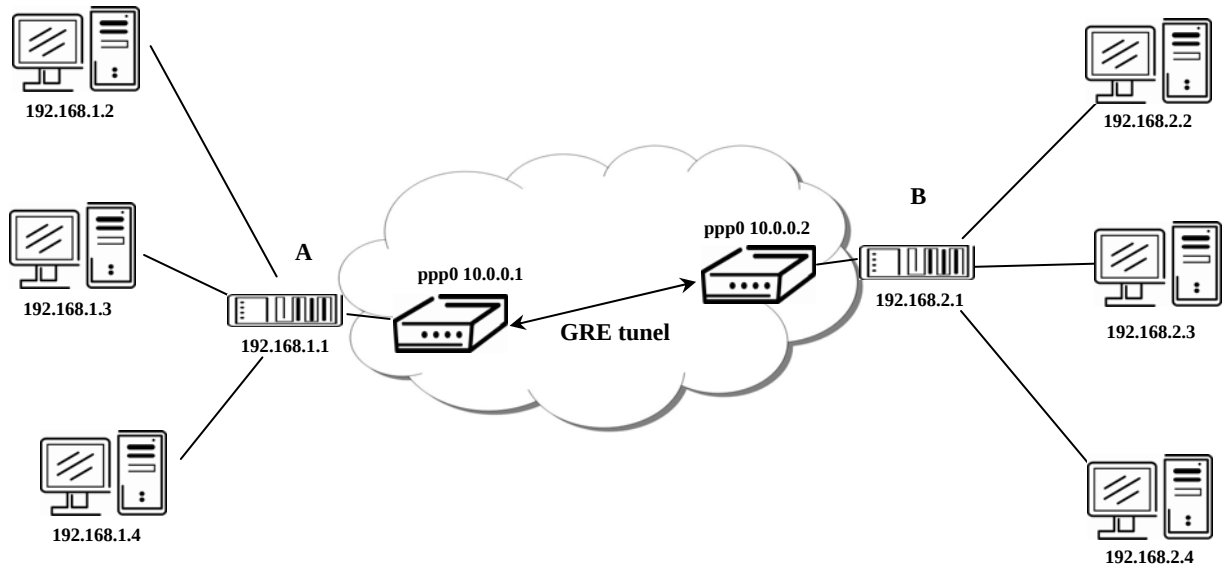
The tunnels are active after entry of choice *Create x GRE tunnel*. In the singles window it is possible to define the IP address of the remote side of the tunnel (*Remote External IP Address*), internal IP address of the local side of the tunnel (*Local Internal IP Address*), internal IP address of the remote side of the tunnel (*Remote Internal IP Address*), address of the network behind the remote side of the tunnel (*Remote Subnet*) and the mask of the network behind the remote side of the tunnel (*Remote Subnet Mask*). The GRE tunnel is used for connection of two networks to one that appears as one homogenous.

Attention, GRE tunnel doesn't connect itself via NAT.

The changes in settings will apply after pressing the *Apply* button.



Example of the GRE Tunnel configuration:



GRE tunnel Configuration:

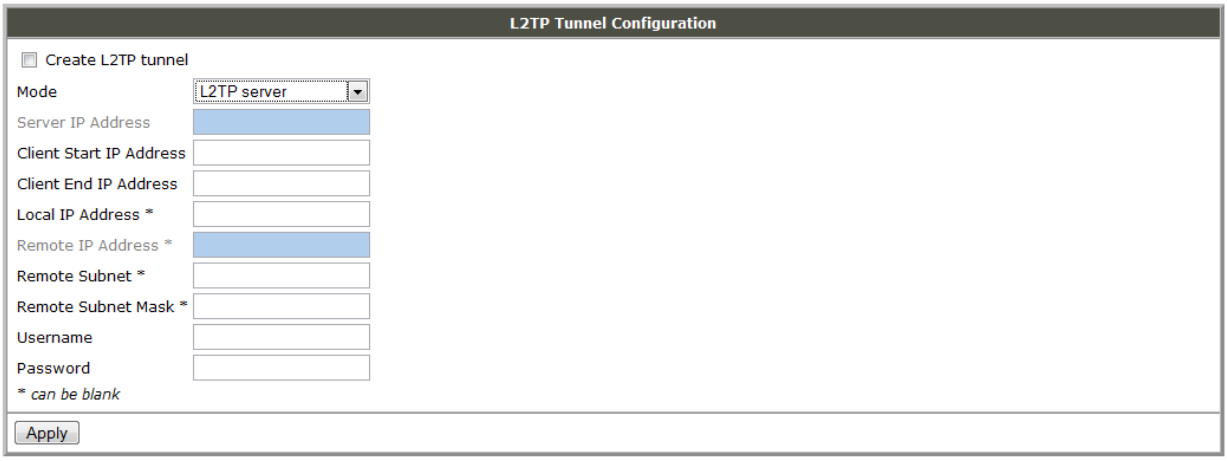
	A	B
Remote External IP Address:	10.0.0.2	10.0.0.1
Remote Subnet:	192.168.2.0	192.168.1.0
Remote Subnet Mask:	255.255.255.0	255.255.255.0

5.15. *L2TP Configuration*

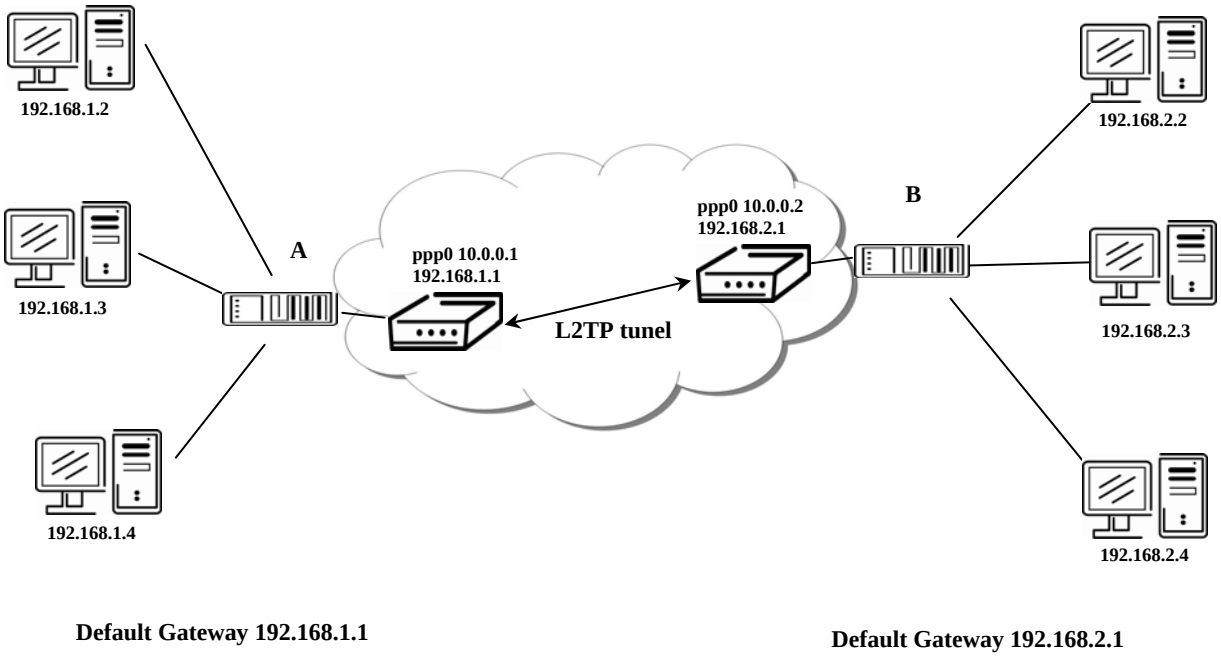
To enter the L2TP tunnels configuration, select the *L2TP* menu item. L2TP tunnel allows protected connection by password of two networks LAN to the one which it looks like one homogenous. The tunnels are active after enter of choice *Create L2TP tunnel*.

In the window it is possible to define L2TP tunnel mode (Mode) on the router side, in case of client IP address of server (Server IP Address), start IP address in range, which is offered by server to clients (Client Start IP Address), end IP address in range, which is offered by server to clients (Client End IP Address), IP address of the local side of the tunnel (Local IP Address), IP address of the remote side of the tunnel (Remote IP Address), address of the network behind the remote side of the tunnel (Remote Subnet), the mask of the network behind the remote side of the tunnel (Remote Subnet Mask), username for login to L2TP tunnel (Username) and password (Password).

The changes in settings will apply after pressing the *Apply* button.



Example of the L2TP Tunnel configuration:



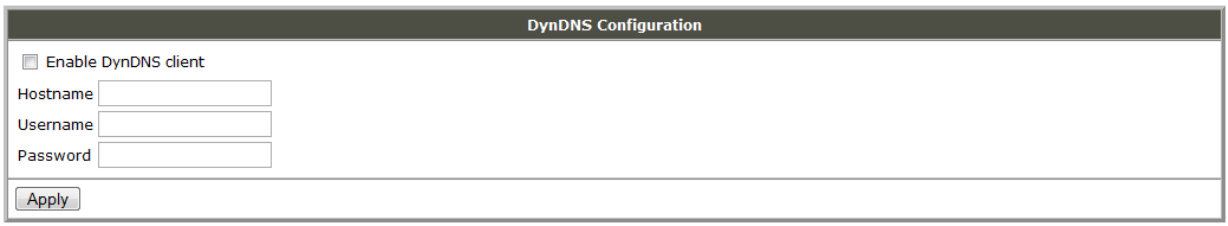
Configuration of the L2TP tunnel:

	A	B
Mode	L2TP Server	L2TP Client
Server IP Address	---	10.0.0.1
Client Start IP Address:	192.168.3.2	---
Client End IP Address:	192.168.3.254	---
Local IP Address:	192.168.3.1	---
Remote IP Address	---	---
Remote Subnet	192.168.2.0	192.168.1.0
Remote Subnet Mask	255.255.255.0	255.255.255.0
Username	username	username
Password	password	password

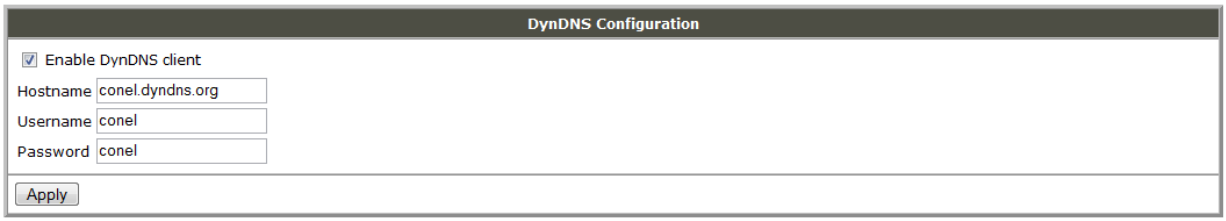
5.16. *DynDNS Client Configuration*

DynDNS client Configuration can be called up by option DynDNS item in the menu. In the window can be defined a third order domain registered on server www.dyndns.org (*Hostname*), user name (*Username*) and password (*Password*).

The changes in settings will apply after pressing the *Apply* button.



Example of the DynDNS client configuration with domain conel.dyndns.org, username conel and password conel:



If DNS servers are not assigned by the operator, then it is possible to configure it by inserting of script into start up window:

echo “nameserver xxx.xxx.xxx.xxx“ > /etc/resolf.conf, where xxx.xxx.xxx.xxx is IP address of the first DNS server,

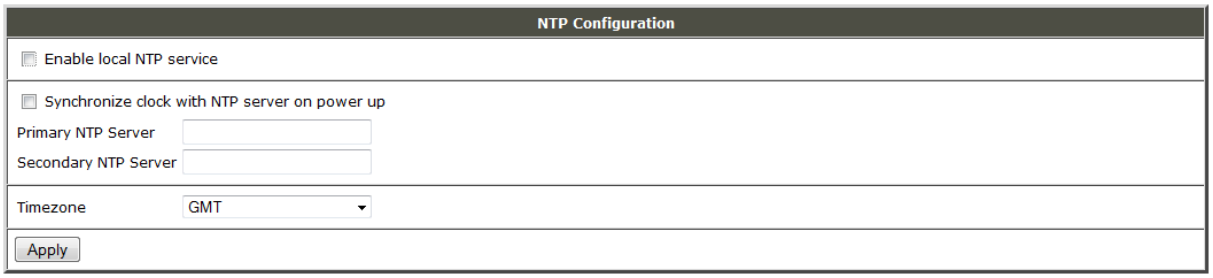
echo “nameserver yvy.yyy.yyy.yyy“ >> /etc/resolf.conf, where yvy.yyy.yyy.yyy is IP address of the second DNS server.

5.17. *NTP Client Configuration*

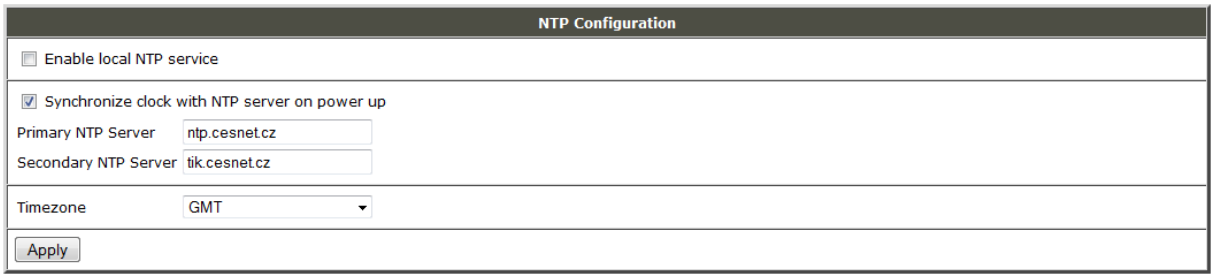
NTP client Configuration can be called up by option NTP item in the menu. In the window can be defined the address prime (Primary NTP server Address) and secondary NTP server (Secondary NTP server Address), by the help of which the router, after first interface to the GPRS from make power supply, will adjust the inner clock. Example of NTP server address can be seenon ntp.isc.org/bin/view/Servers/StratumOneTimeServers. By parameter *Timezone* it is possible to set the time zone of the router.

By parameter *Enable local NTP service* it is possible to set the router in mode, that it can serve as NTP server for other devices.

The changes in settings will apply after pressing the *Apply* button.



Example of the NTP configuration with set primary and secondary NTP server:

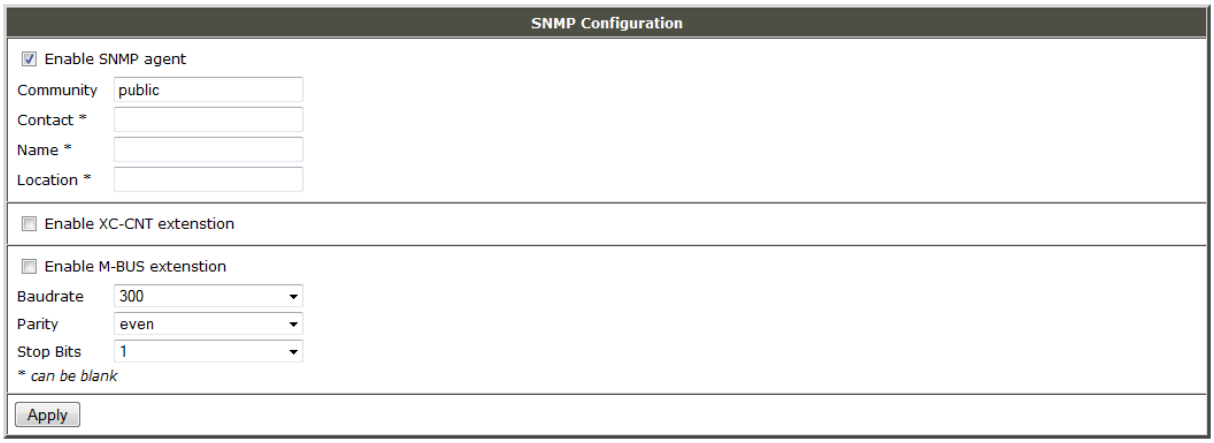


5.18. *SNMP Configuration*

To enter the SNMP Configuration it is possible with SNMP agent ver.1 configuration which sends information about the router, eventually about the status of the expansion port CNT or M-BUS.

The *Community* item defines the password for access to the SNMP agent. Item *Contact* identifies a person who manages the router together with information how to contact this person, item *Name* is the designation of the router and item *Location* describes the physical placing of the router.

By choosing *Enable XC-CNT extension* it is possible to monitor the expansion port CNT inputs status or by choosing *Enable M-BUS extension* and enter the *Baudrate*, *Parity* and *Stop Bits* it is possible to monitor the meter status connected to the expansion port M-BUS status.



Every monitor value is uniquely identified by the help of number identifier **OID** - *Object Identifier*. OID is finished by „.9“.

For the expansion port CNT the following range of OID is used:

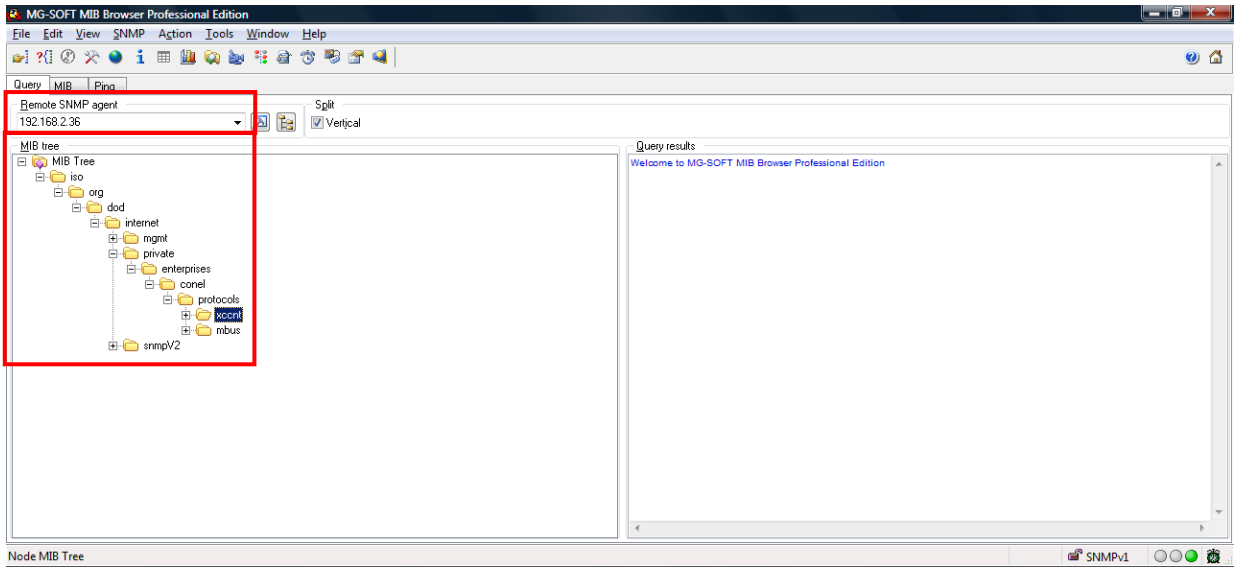
OID	Description
.1.3.6.1.4.1.30140.2.1.1.0	Analogy input AN1 (range 0-4095)
.1.3.6.1.4.1.30140.2.1.2.0	Analogy input AN2 (range 0-4095)
.1.3.6.1.4.1.30140.2.1.3.0	Counter input CNT1 (range 0-4294967295)
.1.3.6.1.4.1.30140.2.1.4.0	Counter input CNT2 (range 0-4294967295)
.1.3.6.1.4.1.30140.2.1.5.0	Binary input BIN1 (values 0,1)
.1.3.6.1.4.1.30140.2.1.6.0	Binary input BIN2 (values 0,1)
.1.3.6.1.4.1.30140.2.1.7.0	Binary input BIN3 (values 0,1)
.1.3.6.1.4.1.30140.2.1.8.0	Binary input BIN4 (values 0,1)

For the expansion port MBUS the following range of OID is used:

OID	Description
.1.3.6.1.4.1.30140.2.2.<address>.1.0	IdNumber – meter number
.1.3.6.1.4.1.30140.2.2.<address>.2.0	Manufacturer
.1.3.6.1.4.1.30140.2.2.<address>.3.0	Version – specified meter version
.1.3.6.1.4.1.30140.2.2.<address>.4.0	Medium – type of metered medium
.1.3.6.1.4.1.30140.2.2.<address>.5.0	Status – errors report
.1.3.6.1.4.1.30140.2.2.<address>.6.0	0. VIF – value information field
.1.3.6.1.4.1.30140.2.2.<address>.7.0	0. measured value
.1.3.6.1.4.1.30140.2.2.<address>.8.0	1. VIF – value information field
.1.3.6.1.4.1.30140.2.2.<address>.9.0	1. measured value
…	
.1.3.6.1.4.1.30140.2.2.<address>.100.0	47. VIF – value information field
.1.3.6.1.4.1.30140.2.2.<address>.101.0	47. measured value

The meter address can be from range 0..254 when 254 is broadcast.

Example of the MIB browser:



It is important to set the IP address of the SNMP agent (router) in field *Remote SNMP agent*. After enter the IP address is in a *MIB tree* part is possible show object identifier. The path to objects is:

iso->org->dod->internet->private->enterprises->conel->protocols.

5.19. *SMS Configuration*

In the *SMS* Configuration menu it is possible to select automatic sending of SMS messages following power up (*Send SMS on power up*) and at the start (*Send SMS on PPP connect*) or the loss (*Send SMS on PPP disconnect*) of the PPP connection and at data limit exceeded (*Send SMS when datalimit exceeded*). With switch-on parameter Send SMS when binary input is active it is possible to define SMS for each of four binary inputs in windows BIN1-SMS, BIN2-SMS, BIN3-SMS and BIN4-SMS, which will be sent if those binary inputs are active. It is possible to send information to three telephone numbers. *Unit ID* is the name of the router that it will send an SMS message to. Unit ID may have a random form.

In the second part of the window it is possible to set function *Enable remote control via SMS*. After this it is possible to establish and close PPP connection by SMS message. This control can be configured for up to three numbers. If is set *Enable remote control via SMS,* all incoming SMS are processed and deleted. In the default settings this parameter is turned on.

If no phone number is filled in, then it is possible to restart the router with the help of SMS in the form of Reboot from any phone number. While filling of one, two or three numbers it is possible to control the router with the help of an SMS sent only from these numbers.

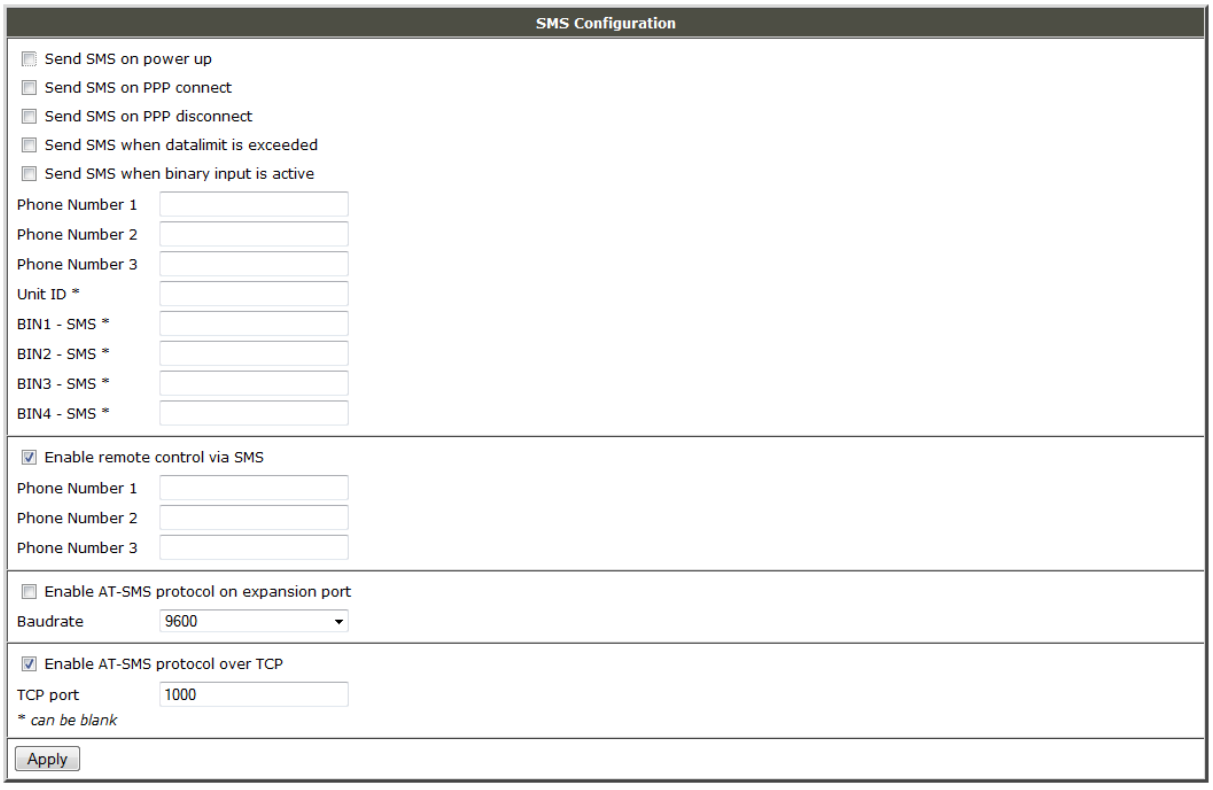
It is possible to send SMS in the form:

SMS	Description
go online sim 1	Switch to SIM1 card
go online sim 2	Switch to SIM2 card
go online	Switch router in online mode
go offline	PPP connection termination
set out=0	Set output on 0 on the Expansion port CNT
set out=1	Set output on 1 on the Expansion port CNT
reboot	Router restart

By choosing *Enable AT-SMS protocol on external port* and *Baudrate* it is possible to send/receive an SMS on the serial port.

By choosing *Enable AT-SMS protocol on TCP port* and enter the *TCP port* it is possible to send/receive an SMS on the TCP port. SMS messages are sent by the help of a standard AT commands. More about the AT commands in reference **[1]**.

Choices *Enable AT-SMS protocol on external port* and *Enable AT-SMS protocol on TCP port* mustn't be chosen at the same time.



After powering up the router, at introduction of the telephone number comes SMS in the form of:

UR5i (Unit ID) has been powered up. PLMN:xxxxx,Cell:xxxx,Channel:xx,Level:-xxdBm.

Where PLMN is – number of mobile operator, Cell – number of cell, Channel – used channel, Level – level signal

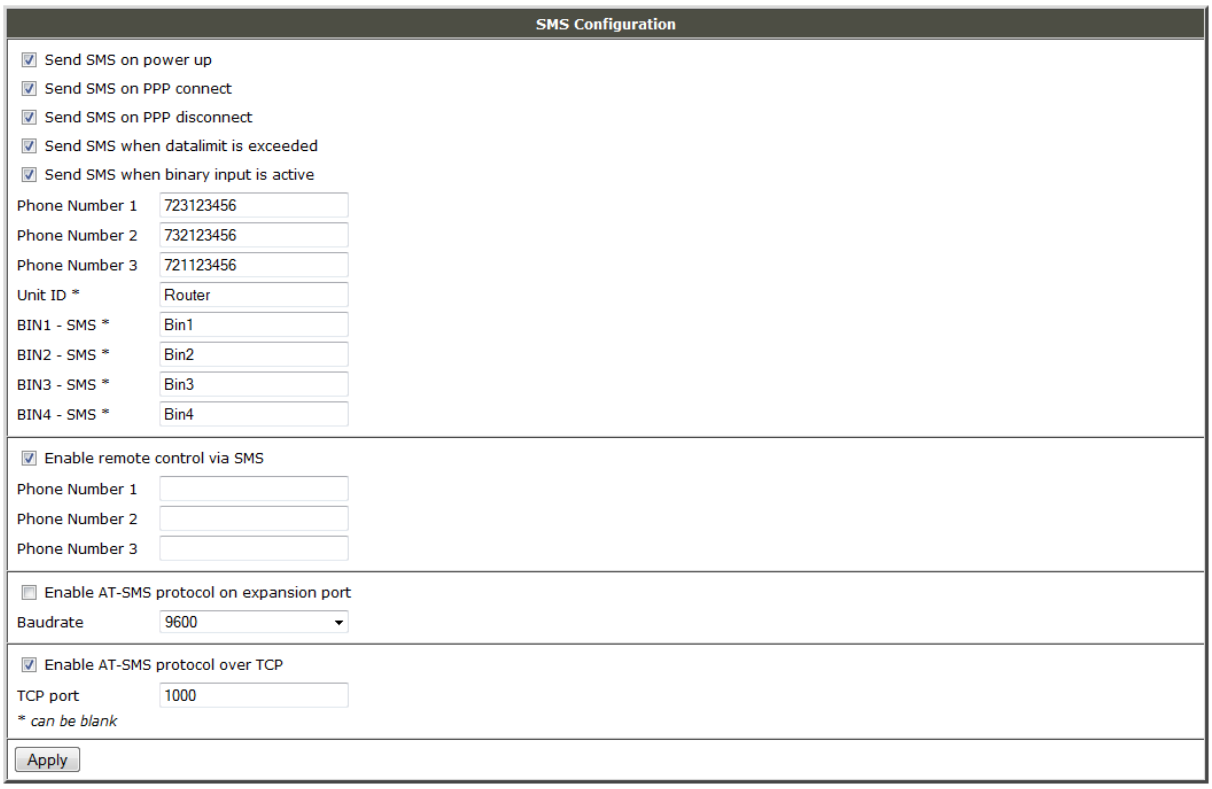
After PPP connect, at introduction of the telephone number comes SMS in the form:

UR5i (Unit ID) has established PPP connection. IP address xxx.xxx.xxx.xxx

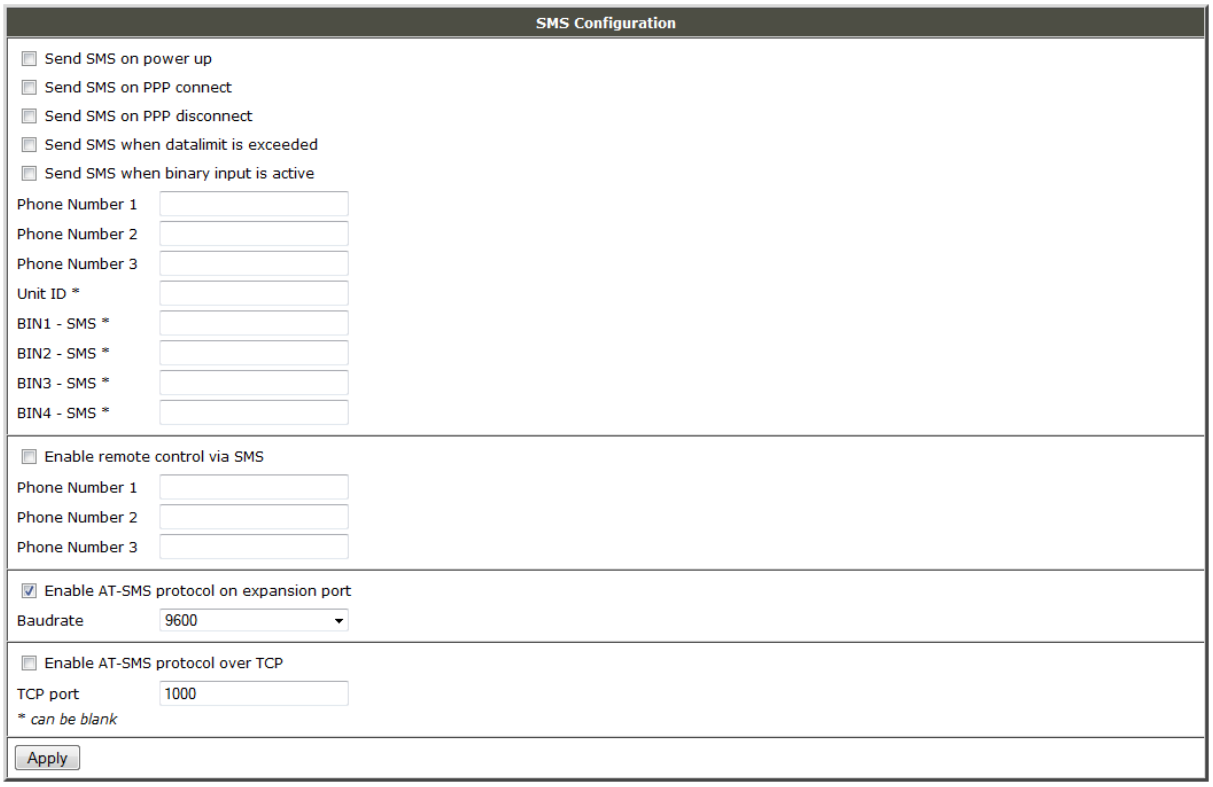
After PPP disconnect, at introduction of the telephone number comes SMS in the form:

UR5i (Unit ID) has lost PPP connection. IP address xxx.xxx.xxx.xxx

Configuration of sending this SMS is following:



Example of the router onfiguration for SMS sending via serial interface:



The SMS is possible to do for example in HyperTerminal program. After establishing connection with the router via serial interface or Ethernet, it is possible to do with SMS by the help of the next AT commands (more about AT commands see reference **[1]**):

AT commands	Description
AT+CMGF=1	Set the text mode for SMS writing
AT+CMGS=”tel. number”	Commands enables to send SMS on entered tel. number
AT+CMGL=ALL	List of all SMS messages
AT+CMGR=<index>	Read of the definite SMS (all SMS has our index)
AT+CMGD=<index>	SMS delete according to index

For the text mode for SMS writing is used command *AT+CMGF=1*.

AT+CMGF=1 Enter

OK

The SMS message is created by the help of command *AT+CMGS=<tel. number>*. After *Enter* button is pressed is displayed mark >, behind this mark it is possible to write your own SMS message. The SMS message is sent by the help of *CTRL+Z* (SMS sending takes a few minutes). SMS writing is possible to cancel by pressing *Esc*.

AT+CMGS=”712123456” Enter

>Hello World! CTRL+Z (keys combination)

OK

It is possible to find the new SMS by the help of command *AT+CMGL=ALL*. This command reproaches all SMS messages.

AT+CMGL=ALL Enter

+CMGL: <index>, <status>,<sender number>, ,<date>,<time>
SMS text.

+CMGL: 1,"REC UNREAD","+420721123456", ,"08/02/02, 10:33:26+04"
Hello World!

where <index> is ordinal number of the SMS,

<status> is SMS status:

REC UNREAD – SMS unread
REC READ – SMS read
STO UNSENT – stored unsent SMS
STO SENT – stored sent SMS
ALL – all SMS messages

<sender number> is tel. number from which the SMS was receive,

<date> is date of SMS receive,

<time> is time of SMS receive.

It is possible to read the new SMS message by command AT+CMGR=<index>.

AT+CMGR=1 Enter

+CMGL: <index>, <status>,<sender number>, ,<date>,<time>
SMS text.

+CMGL: 1,"REC READ","+420721123456", ,"08/01/12, 9:48:04+04"
Hello World!

Received SMS is possible delete by command AT+CMGD=<index>.

AT+CMGD=1 Enter

OK

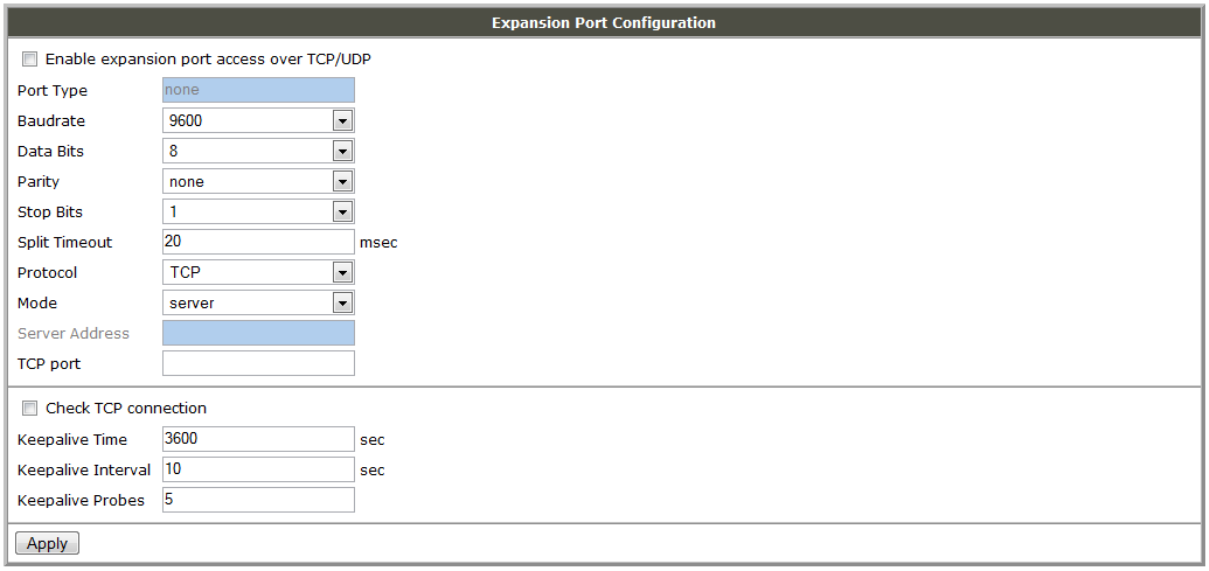
5.20. *External Port Configuration*

The expansion port configuration can be called up by airbrush option External Port in menu. Inside the window can be defined *Baudrate*, number of *Data bits*, *Parity*, number of *Stop bits*, *Protocol* and *Mode*. *Split timeout* is for messages.

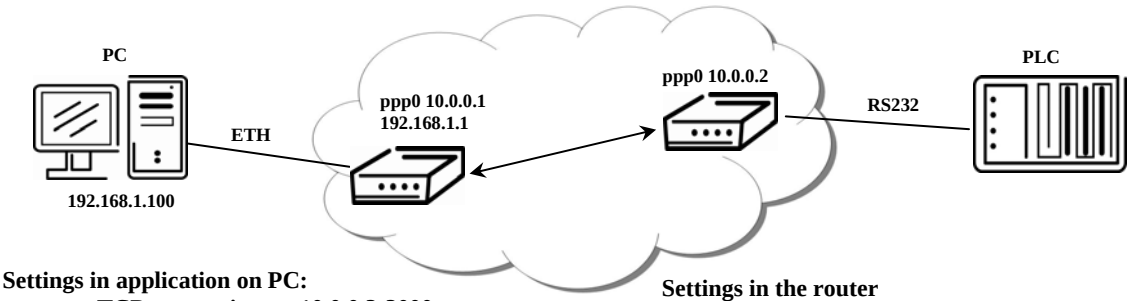
In mode *TCP server* it is necessary to enter the *TCP port*, on which the router will listen to incoming requests about TCP connection. In mode *TCP client* it is necessary to enter the *Server address* and final *TCP port*.

At *Check TCP connection* it activates verification of coupled TCP connection. Inside the window can be define time, after which it will carry out verification of the connection (*Keepalive Time*), waiting time on answer (*Keepalive Interval*) and number of tests (*Keepalive Probes*).

The changes in settings will apply after pressing the *Apply* button.



Example of external port configuration:

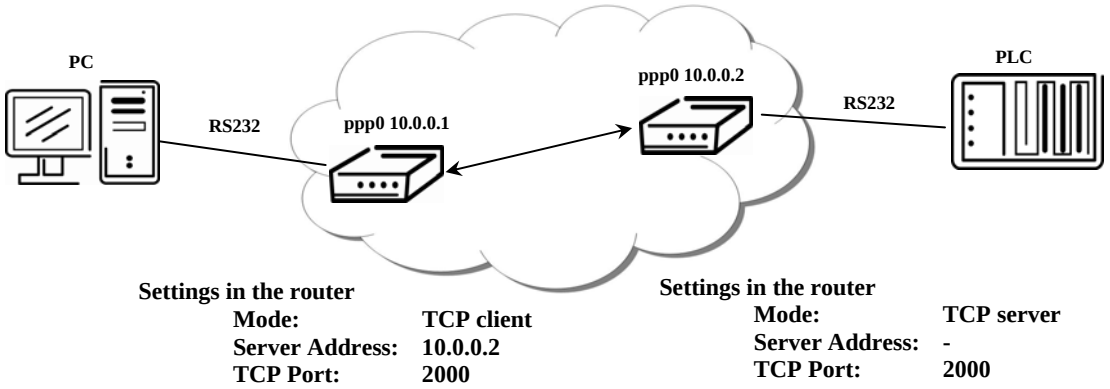


Settings in application on PC:
TCP connection on 10.0.0.2:2000

Default Gateway 192.168.1.1

Settings in the router

Mode:	**TCP server**
Server Address:	**-**
TCP Port:	**2000**



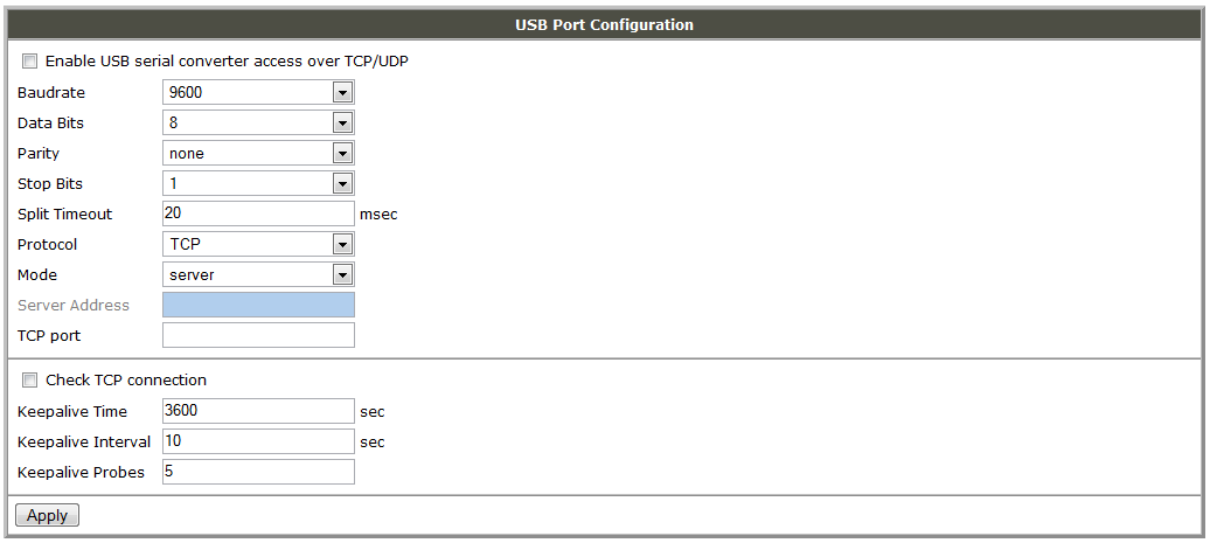
5.21. *USB Port Configuration*

The USB port configuration can be called up by airbrush option *USB Port* in menu. Inside the window can be defined *Baudrate*, number of *Data bits*, *Parity*, number of *Stop bits*, *Protocol* and *Mode*. *Split timeout* is for messages.

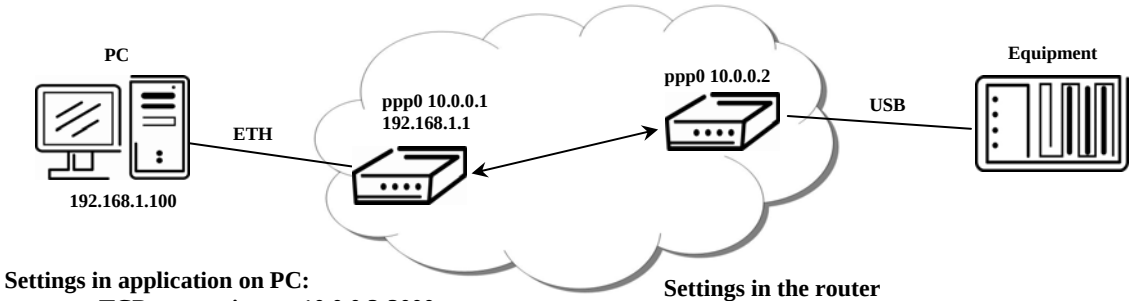
In mode *TCP server* it is necessary to enter the *TCP port*, on which the router will listen to incoming requests about TCP connection. In mode *TCP client* it is necessary to enter the *Server address* and final *TCP port*.

At *Check TCP connection* it activates verification of coupled TCP connection. Inside the window can be define time, after which it will carry out verification of the connection (*Keepalive Time*), waiting time on answer (*Keepalive Interval*) and number of tests (*Keepalive Probes*).

The changes in settings will apply after pressing the *Apply* button



Example of USB port configuration:

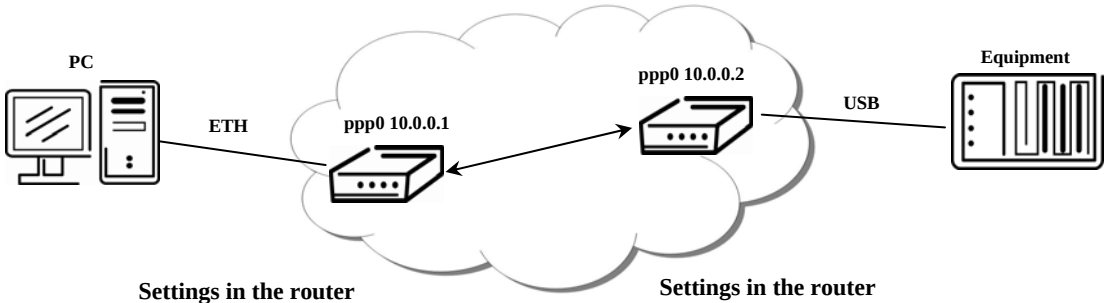


Settings in application on PC:
TCP connection on 10.0.0.2:2000

Default Gateway 192.168.1.1

Settings in the router

Mode:	**TCP server**
Server Address:	**-**
TCP Port:	**2000**



Settings in the router

Mode:	**TCP client**
Server Address:	**10.0.0.2**
TCP Port:	**2000**

Settings in the router

Mode:	**TCP server**
Server Address:	**-**
TCP Port:	**2000**

5.22. *Startup Script*

In the window *Startup Script* it is possible to create own scripts which will be executed after all initial scripts. This script is not stored or restored when using web interface backup or restore option.

The changes in settings will apply after pressing the *Apply* button.

Startup Script
#!/bin/sh
#
This script will be executed *after* all the other init scripts.
You can put your own initialization stuff in here.
Apply

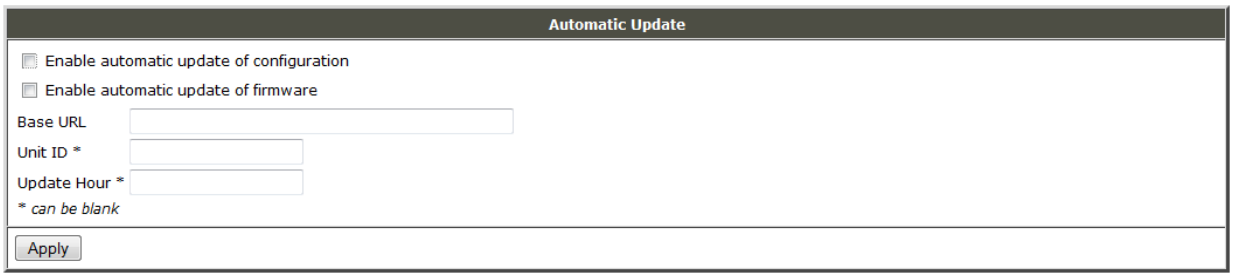
5.23. *Automatic update configuration*

In the window *Automatic update* it is possible to set automatic configuration update. This choice enables that the router automatically downloads the configuration and the newest firmware from the server itself. The configuration and firmware are stores on the server.

By *Enable automatic update of configuration* it is possible to enable automatic configuration update. By parameter *Base URL* it is possible to enter base part of the domain or IP address, from which the configuration file will be downloaded. In the case that *Unit ID* is empty, the contents of parameter *Unite ID* or MAC address is added to *Base URL*. The configuration file name is from parameter *Base URL*, hardware MAC address of ETH0 interface and *cfg* extension. Hardware MAC address and *cfg* extension is connected automatically and it isn't needed to enter this. By parameter *Unit ID* enabled it defines the concrete configuration name which will be download to the router. When using parameter *Unit ID*, hardware MAC address in configuration name will not be used.

Automatic configuration update starts 5 minutes after turning on the router and then every 24 hours or it is possible to set the time of automatic configuration in parameter *Update Hour.* If the entered URL is different configuration than in the router then the router downloads this configuration and restarts itself.

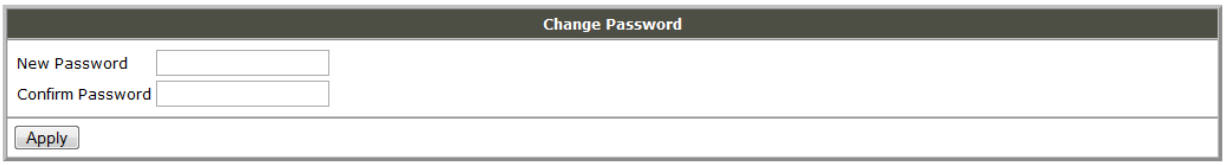
The changes in settings will apply after pressing the *Apply* button.



5.24. *Change password*

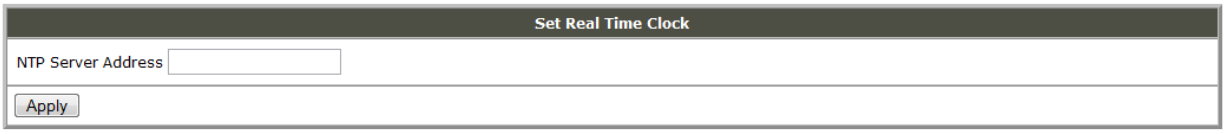
To open the dialog box for changing the access password select the *Change Password* menu item. The new password will be saved after pressing the *Apply* button.

In basic settings of the router the password is set on default form *root*. For higher security of your network we recommend changing this password.



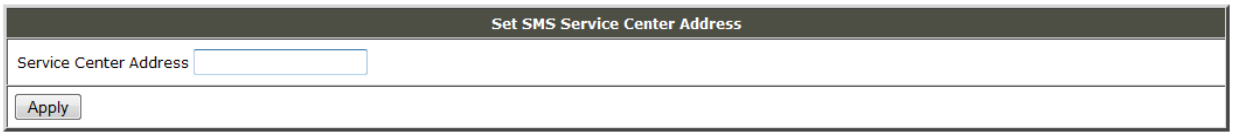
5.25. *Set real time clock*

One - shot inner clock of the router setting can be called up in option *Set Real Time Clock item* in the menu. Clocks are set according to the engaged NTP server after push-button operation *Apply.*



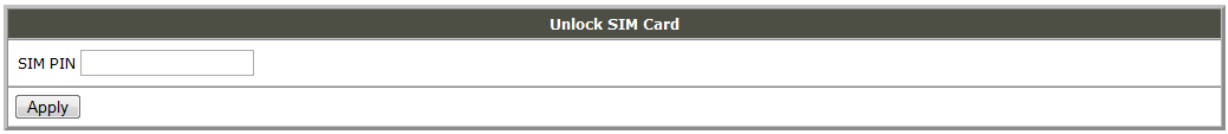
5.26. *Set SMS service center address*

In some cases it is need to set phone number of the SMS service centre because of SMS sending. This parameter can not be set when the SIM card has set phone number of the SMS service centre. The phone number can to have formed without international prefix xxx xxx xxx or with international prefix for example +49 xxx xxx xxx.



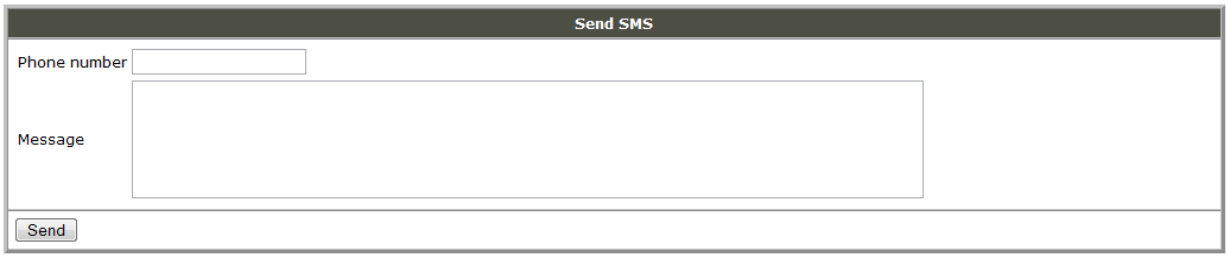
5.27. *Unlock SIM card*

Possibility to unlock SIM PIN is under *Unlock SIM Card* item. If the inserted SIM card is secured by a PIN number, enter the PIN to field *SIM PIN* and push-button *Apply*.



5.28. *Send SMS*

Sending SMS messages is possible in menu *Send SMS*. The SMS message will be sent after entering the *Phone number* and text SMS (*Message*) and by pushing button *Send.*



SMS message sending via HTTP request is in the form:

GET /send_exec.cgi?phone=%2B**420712345678**&message=**Test** HTTP/1.1
Authorization: Basic cm9vdDpyb290

HTTP request will be sent to TCP connection on router port 80 which sends an SMS message *Test* to phone number *420712345678*. Authorization is in the format "user:password" coded by BASE64, example is for root:root.

5.29. *Backup Configuration*

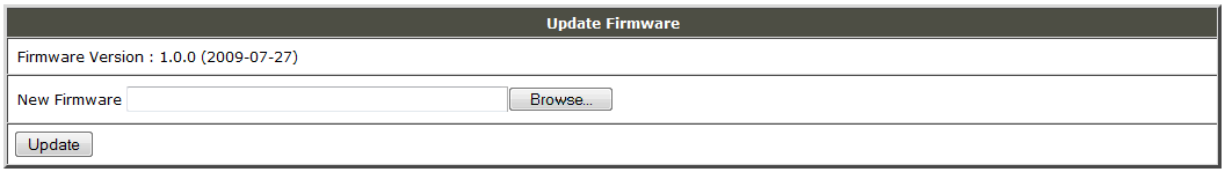
The router configuration is possible to save by help of the *Backup Configuration* menu item. After clicking on this menu it is possible to check a destination directory, where it will save the router configuration.

5.30. *Restore Configuration*

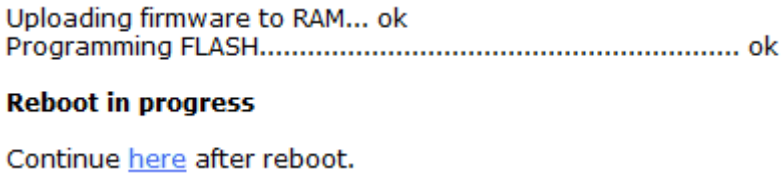
In case it is needed to restore the router configuration, it is possible in *Restore Configuration* menu item to check configuration by help *Browse* button.

5.31. *Update firmware*

To view the information about the firmware version and instructions for its update select the *Update Firmware* menu item. The new firmware will be checked after pressing *Browse* button and update the following pressing the Update button.



After successful firmware updating the following statement is listed:

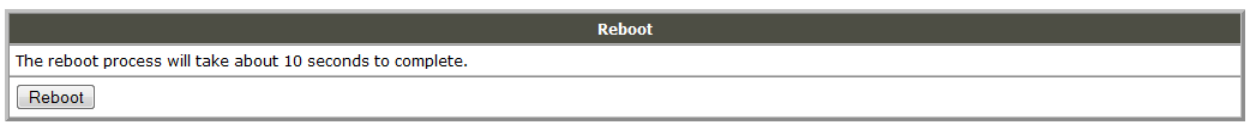


There is information about updating of the FLASH memory.

By firmware actualization the router configuration is remains include IP address. During updating of the firmware permanent power supply has to be maintained. We strongly recommend not using distant update because of blackout GPRS connection.

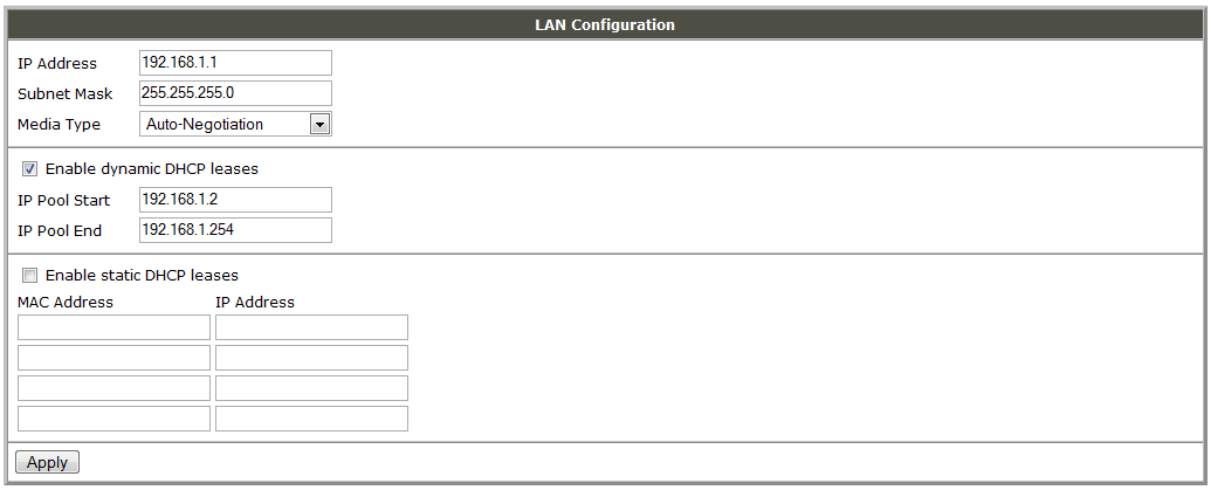
5.32. *Reboot*

To reboot the router select the *Reboot* menu item and then press the *Reboot* button.

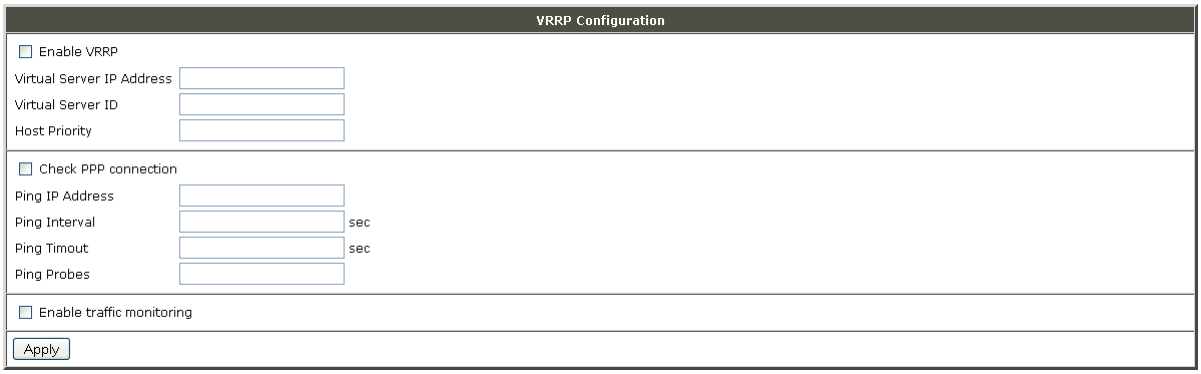


5.33. *Default settings*

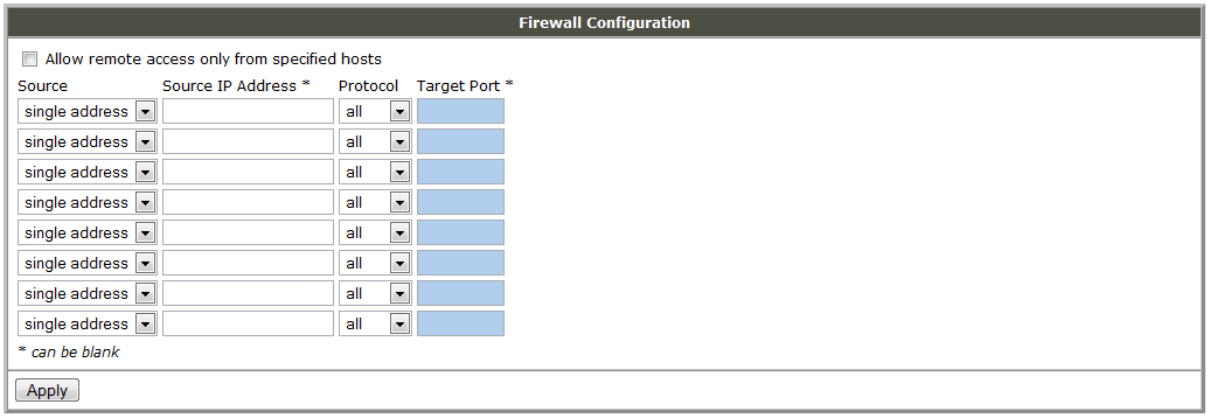
5.33.1. LAN Configuration



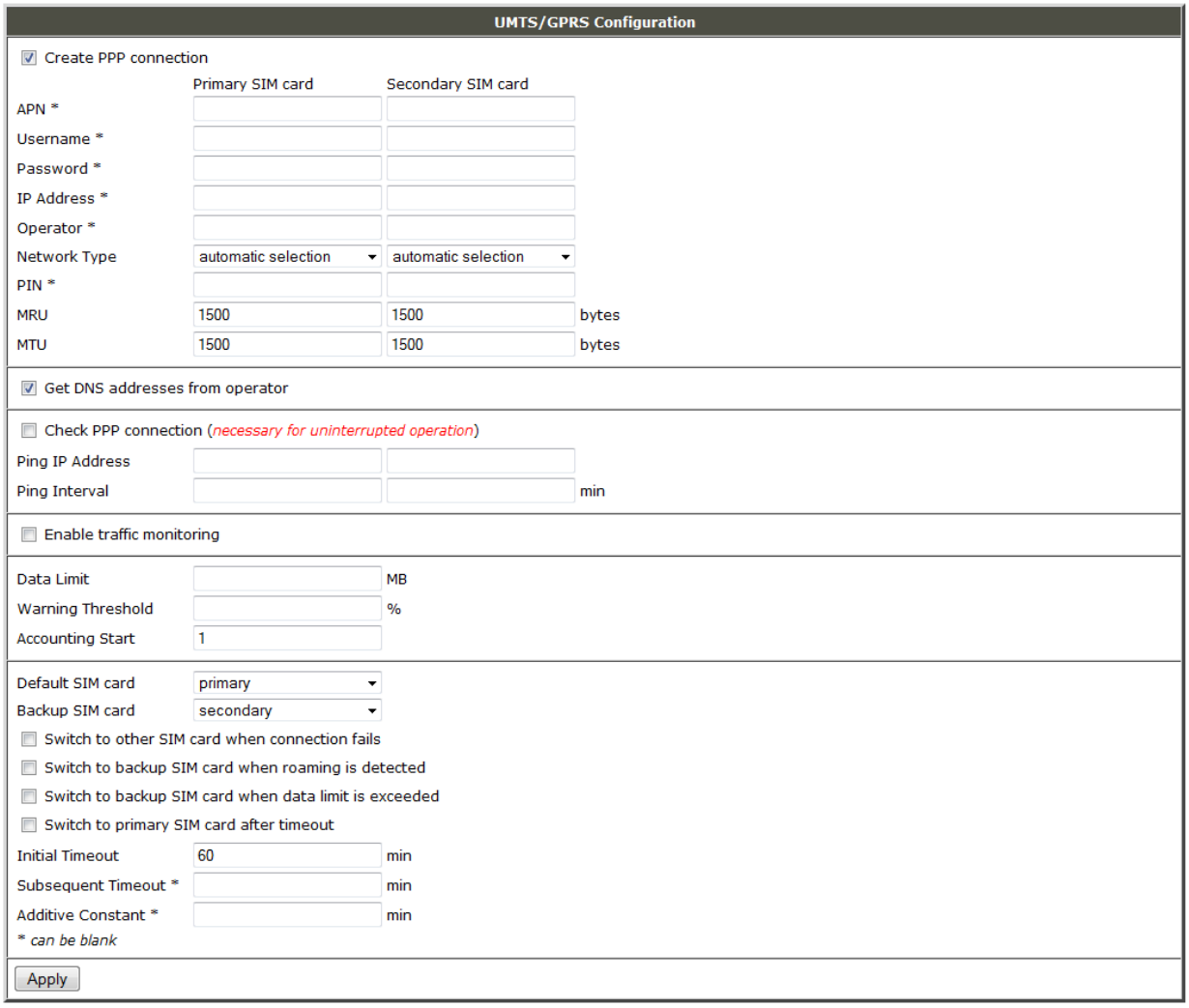
5.33.2. VRRP Configuration



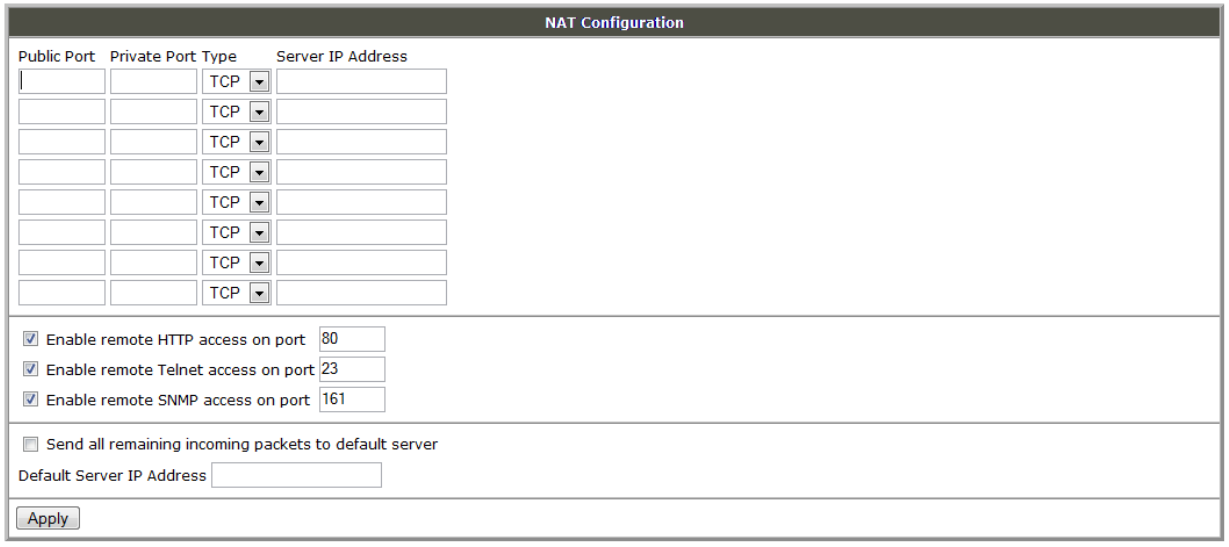
5.33.3. Firewall Configuration



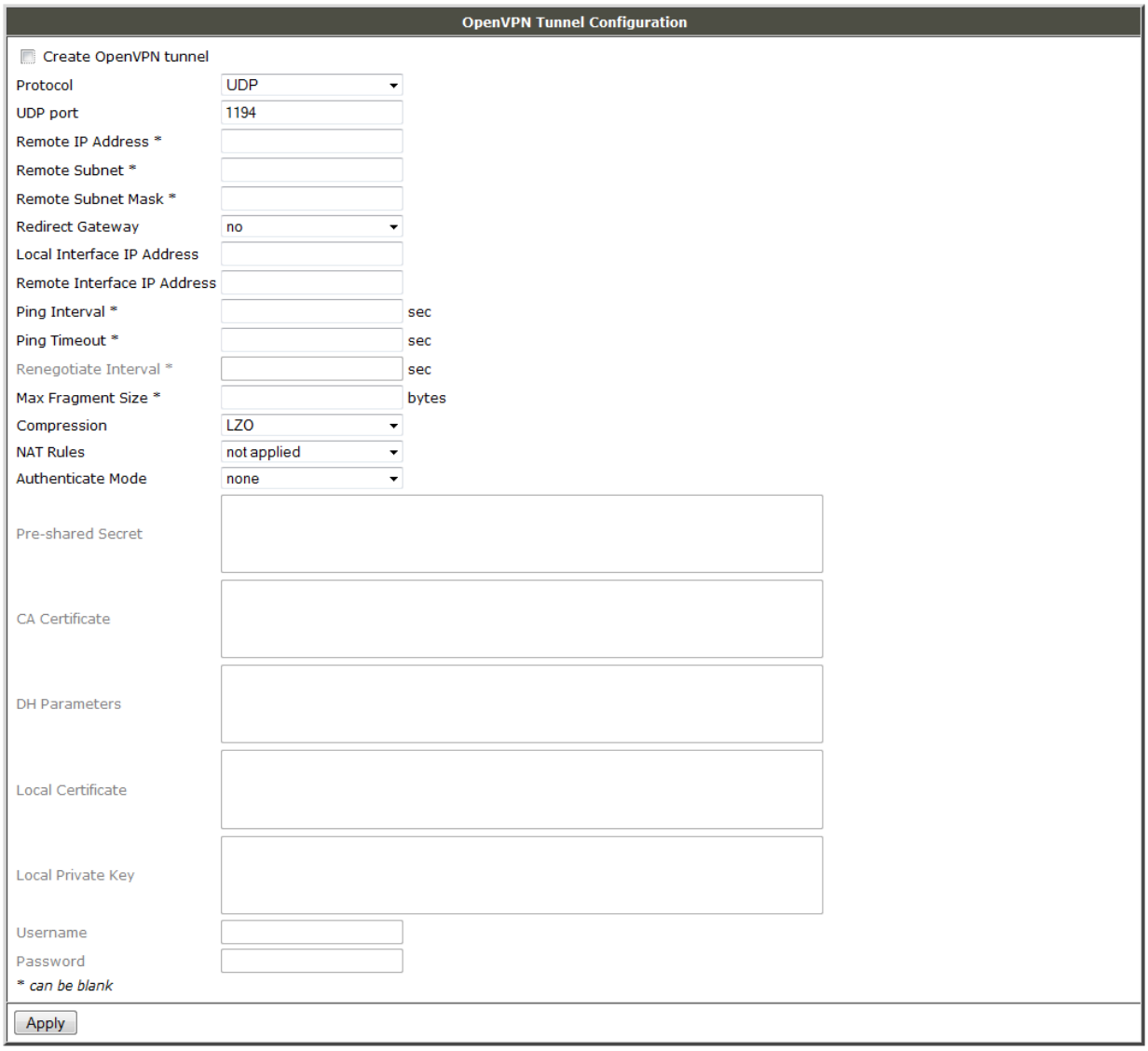
5.33.4. UMTS/GPRS Configuration



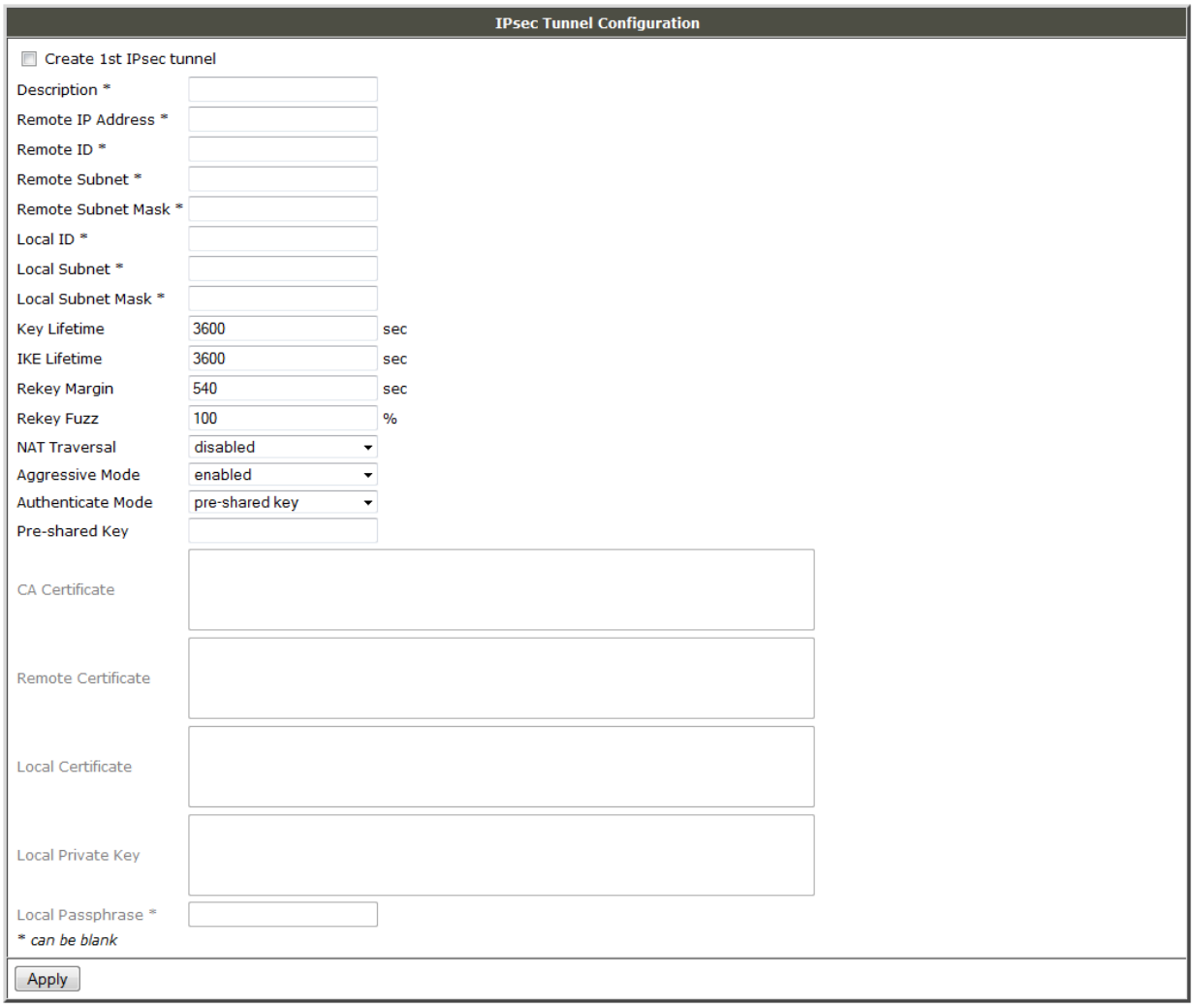
5.33.5. NAT Configuration



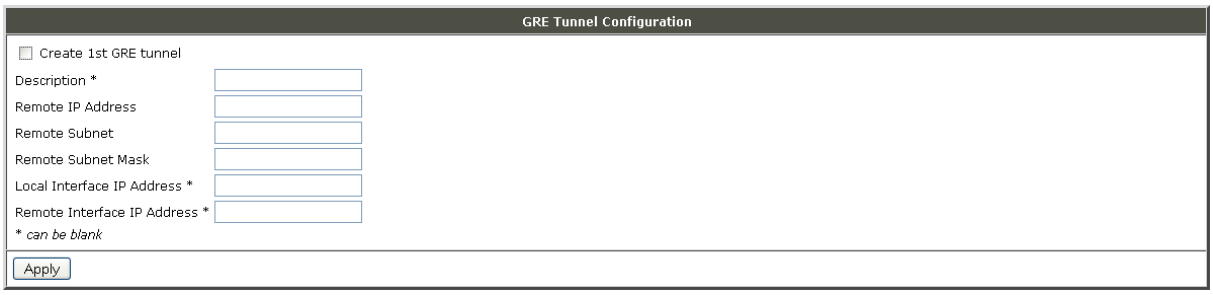
5.33.6. OpenVPN Tunnel Configuration



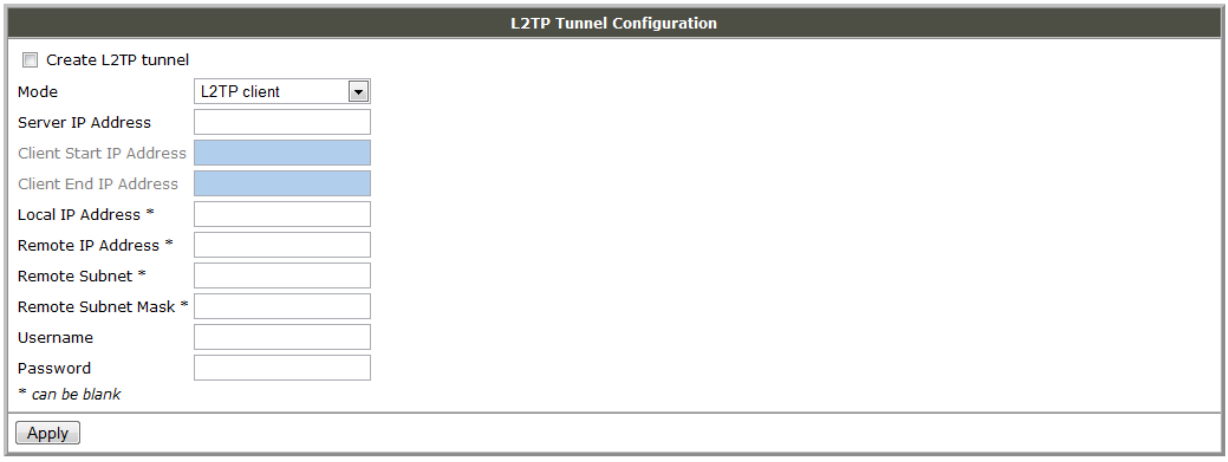
5.33.7. IPsec Tunnel Configuration



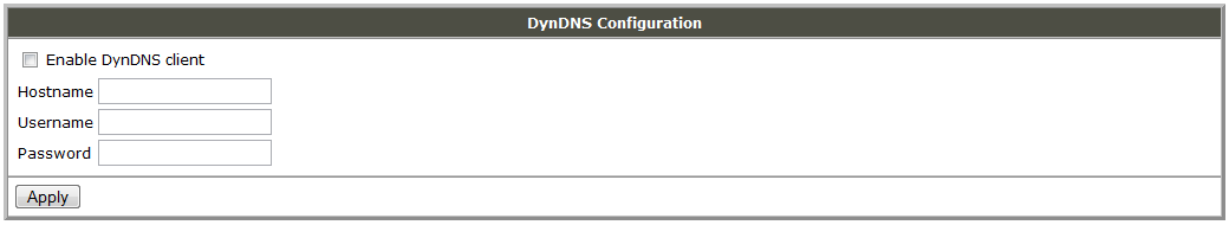
5.33.8. GRE Tunnels Configuration



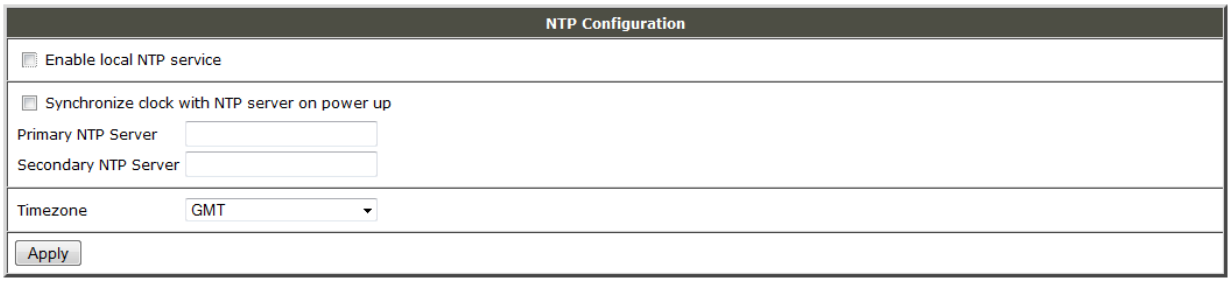
5.33.9. L2TP Tunnel Configuration



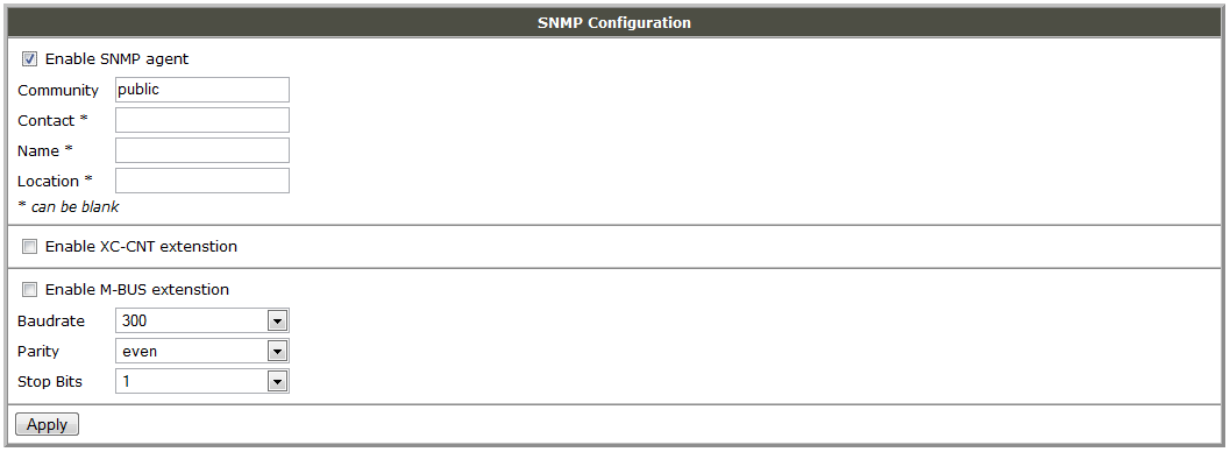
5.33.10. DynDNS Configuration



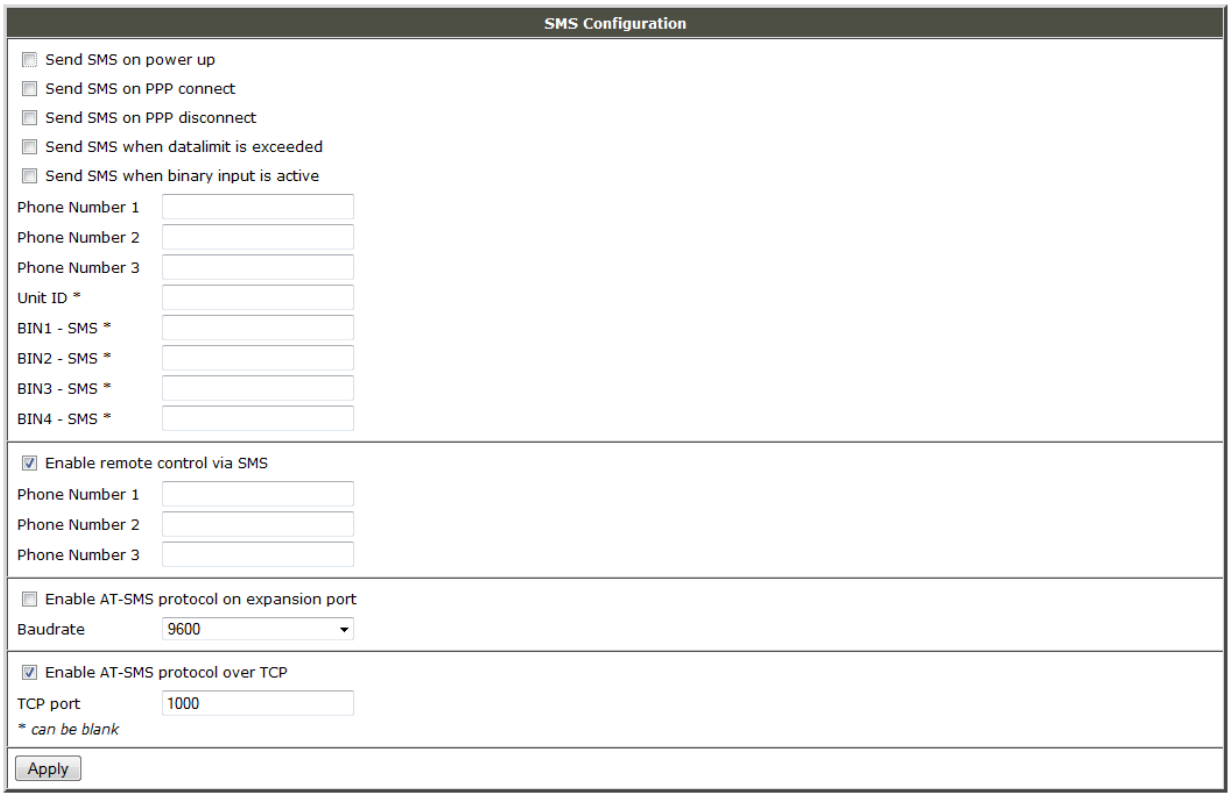
5.33.11. NTP Configuration



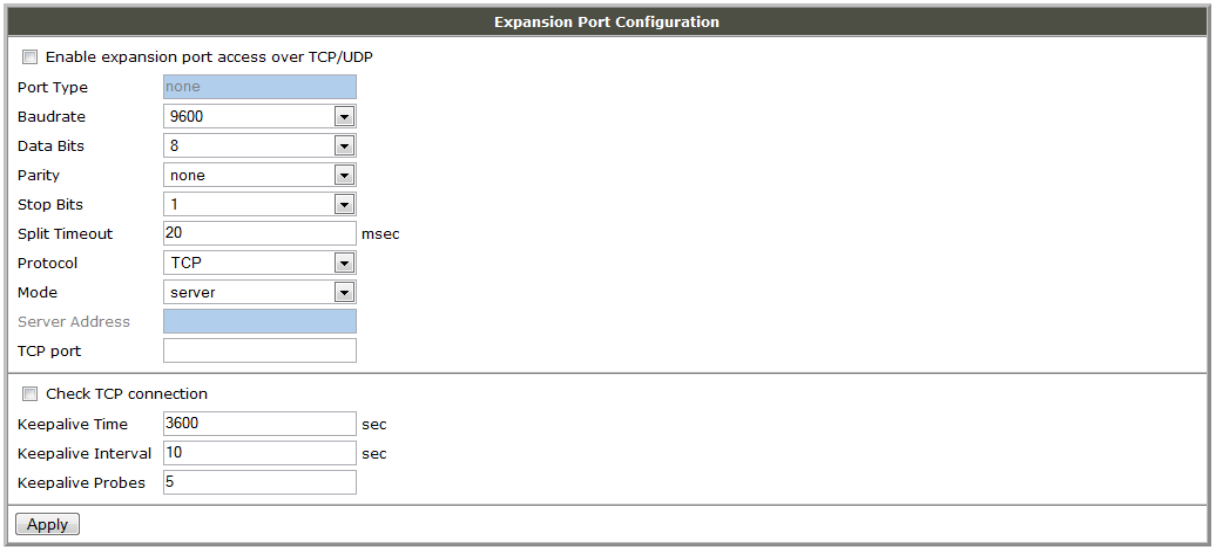
5.33.12. SNMP Configuration



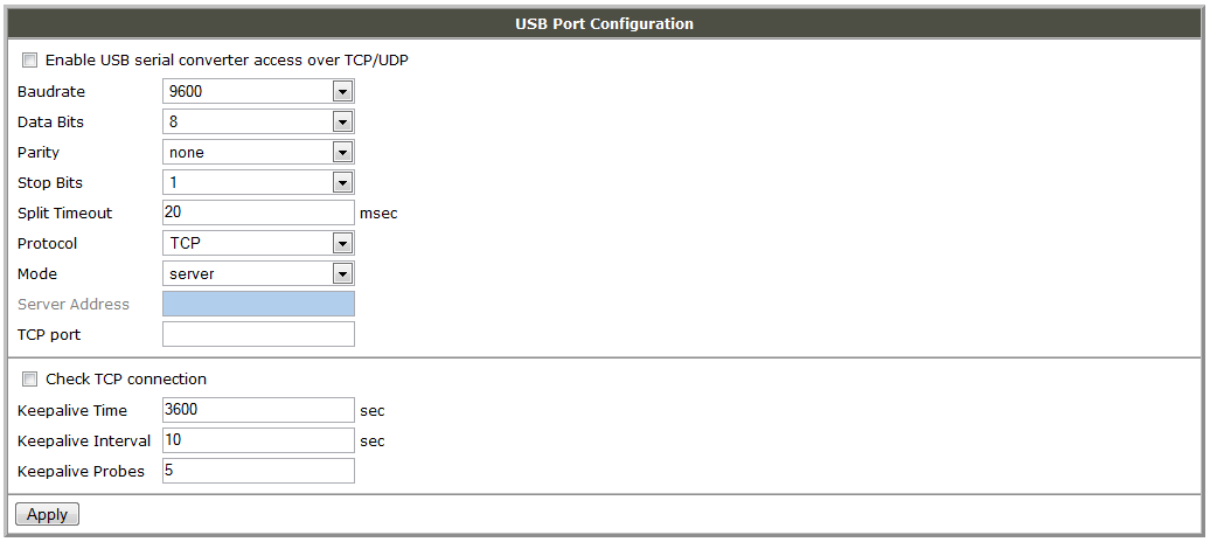
5.33.13. SMS Configuration



5.33.14. Expansion Port Configuration



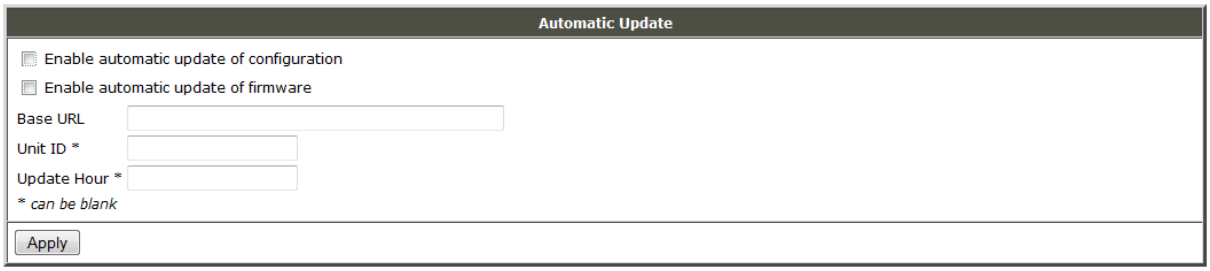
5.33.15. USB Port Configuration



5.33.16. Startup script

Startup Script
#!/bin/sh
#
This script will be executed *after* all the other init scripts.
You can put your own initialization stuff in here.
Apply

5.33.17. Automatic update



6. Configuration setting over Telnet

Attention! If the SIM card isn't included in the router, it is impossible for the router to operate. The Included SIM card must be activated for GPRS transmissions. Insert the SIM card when the router is switched off.

Monitoring of status, configuration and administration of the router can be performed by means of the Telnet interface. After IP address entry to the Telnet interface it is possible to configure the router by the help of commands. The default IP address of the router is 192.168.1.1. Configuration may be performed only by the user "root" with initial password "root".

For Telnet exists the following commands:

Command	Description
cat	file contain write
cp	copy of file
date	show/change of system time
df	displaying of informations about file system
dmesg	displaying of kernel diagnostics messages
echo	string write
free	displaying of informations about memory
gsmat	AT commend send
gsminfo	displaying of informations about signal quality
gsmsms	SMS send
hwclock	displaying/change of time in RTC
ifconfig	displaying/change of interface configuration
ip	displaying/change of route table
iptables	displaying/modification of NetFilter rules
kill	process kill
killall	processes kill
ln	link create
ls	dump of directory contain
mkdir	file create
mv	file move
ntpdate	synchronization of system time with NTP server
passwd	password change
ping	ICMP ping
ps	displaying of processes information
pwd	dump of actual directory
reboot	restart
rm	file delete
rmdir	directory delete
route	displaying/change of route table
service	start/stop of service
sleep	pause on set seconds number
slog	displaying of system log
tail	displaying of file end
tcpdump	monitoring of network
touch	file create/actualization of file time stamp
vi	text editor

7. Possible problems

Some network cards are able to be set in situation, when it is not possible to connect the router. It is possible to solve this problem in the following steps:

- hand by selection communication rates 10 MB/s in property network cards,
- connect router over switch,
- starts computer only after finalization start router.

8. Reference

[1] Sierra Wireless**: UMTS modems – Supported AT Commands Reference, 2008**

9. FAQ

- I can't get from internet on equipment, which is connected to router and I have NAT enabled.
  - *The device's gateway has to be configured as the router.*
- Router resets itself, connection on Ethernet fails.
  - *It is necessary to use an antenna, which will be situated far from power supply.*
- I don't get on web server at NAT.
  - *The remote http access of the router has to be disabled, default server address has to be your web server and the gateway of the web server has to be the IP of router.*
- PPP connection fails.
  - *Check signal power. If signal power is weak, you will have to use a better antenna. If the environmental cells have a similar signal it will be necessary to use a directive antenna. Signal levels have to be in the range -50dBm and -90dBm.*
  - *It is necessary to set ping, which will check the connection and, in the case of fail ping, restart connection.*
- PPP connection won't be established.
  - *Recheck GPRS settings - APN, name, password and IP address.*
  - *Try to enter PIN – verification if the SIM card hasn't set PIN code.*
  - *In private APN it is appropriate to switch the DNS server send off.*
  - *Switch log system on and observe where the error turns up.*
- Connection fails on Ethernet or connection isn't establishing.
  - *On ethernet interface of the router it is possible to switch auto negotiation off and set a rate and duplex by hand.*
- DynDNS not function.
  - *In private APN not functional.*
  - *If the same IP address is recorded in your canonic name as dynamically assign address, it means that the operator is using NAT or firewall.*
  - *NAT is possible to verify by the help of the ping on address of your server with static IP address and by the help of the router address verify and address in ping.*
  - *Firewall is possible to verify, for example by remote access on web interface.*
  - *The operator doesn't give out address DNS servers and without DNS server's it is impossible to connect to server dyndns.org. In log system will be this message:*

- DynDNS daemon started,
- Error resolving hostname: no such file or directory,
- Connect to DynDNS server failed.

- IPSec tunnel is establishing but communication doesn't function.
  - *Probably it is badly set up route conditionals of connected equipment or it is bad set up GW.*
- FTP doesn't function.
  - *Router doesn't support the active FTP mode, supports the passive mode only.*
- RS232 doesn't function.
  - *It is necessary to verify present the expansion port RS232.*
  - *Verify present the expansion port RS232 in router configuration in menu „external port", or verify connection locally by the help Telnet-Hyper terminal.*
- L2TP or IPSec isn't establishing.
  - *Verify the reason in the log system.*

10. Customers support

Up to date information about the product are on website:

http://www.conel.cz/

Upkeep-advices:
The SIM-card must be handled carefully as with a credit card. Do not bend, do not scratch on this and do not expose to static electricity.
During cleaning of the router do not use aggressive chemicals, solvents and abrasive cleaners!

Conel Company hereby declares that the router narrated in this user's guide fits all basic demands of directive 1999/5/EC (R&TTE).

The router fits values of coefficient SAR defined by association ICNIRP and values of "About protection of health before non-ionized radiation".

CE Declaration about consistency was issued and is possible get it at producer.

11. Product disposal instructions

The WEEE (Waste Electrical and Electronic Equipment: 2002/96/EC) directive has been introduced to ensure that electrical/electronic products are recycled using the best available recovery techniques to minimise the impact on the environment. This product contains high quality materials and components which can be recycled. At the end of it's life this product MUST NOT be mixed with other commercial waste for disposal. Check with the terms and conditions of your supplier for disposal information.

12. Guarantee Claim Guidelines

Dear customer,

The product that you have purchased was tested by the manufacturer and, before it was sold, the product's functions were checked once more by our company's technician. However if, in spite of the above-mentioned measures, a breakdown of this product occurs during the guarantee period, which makes proper utilization of the product impossible, we ask you to observe the Guarantee Claim Guidelines when asserting a guarantee claim.

To facilitate the possible guarantee claim procedure, please, when taking over the product, make sure that the seller, who is selling you the product, has properly filled in the relevant parts of the guarantee certificate, including the date of sale, stamp and signature.

This guarantee claim procedure applies to the products that have been purchased. This guarantee claim procedure does not apply to the services that have been provided.

Guarantee periods of products

Guarantee of the purchased device, power supply unit, antenna, data cable, and possible accessories is provided, with a guarantee period of 24 months from the date of sale. The date of sale is at the same time the date of acceptance of the product by the customer.

Lodging a guarantee claim

The guarantee claim must be lodged at the seller from whom the relevant object of the guarantee claim has been purchased. When lodging the guarantee claim, the customer is to submit the properly filled-in guarantee certificate and the complete object of the guarantee claim. The object of the guarantee claim should be submitted in a state corresponding to the state at the sale.

Caution!

The seller does not guarantee that individual settings or data stored in the object of the guarantee claim will be retained.

When lodging the guarantee claim, the customer is obligated to specify the particular defect of the guarantee claim object, possibly its symptoms and, furthermore, the particular right resulting from the liability for defects that he is asserting.

Settling a guarantee claim

Depending on the circumstances, the seller shall ensure the defect removal free of charge; possibly, the seller shall exchange the object of the guarantee claim for a new product or, possibly, settle the guarantee claim in a different way which is in compliance with the Civil Code and with the Consumer Protection Act.

At the moment when the customer has lodged the guarantee claim and the object of the guarantee claim has been accepted by the seller, running of the guarantee period is interrupted. Running of the guarantee period shall continue from the date of acceptance of the repaired object of the guarantee claim or of the exchanged faultless product by the customer or, in the event that neither of the two has been accepted by the customer, from the date when the customer was obligated to accept the repaired object of the guarantee claim or the exchanged product. In the event that a guarantee claim resulting from a defect covered by the guarantee has been lodged and the defective object of the guarantee claim has been exchanged by the seller for a new product (including the exchange of the IMEI), the ownership of the original object of the guarantee claim is passed

hereupon onto the seller, and the ownership of the new product, onto the buyer. A new guarantee period starts running from the date of acceptance of the new product. In the event that the seller, upon agreement with the customer, has settled the guarantee claim by exchanging the object of the guarantee claim for a faultless product, the new guarantee of the product shall expire as follows:

1. After the expiration of a period of 12 months from the date of acceptance of the exchanged product by the customer.
2. On the date when the guarantee period of the original product (the object of the guarantee claim) would have expired if the original product had not been exchanged, whichever is later.
3. The guarantee claim is not justified if the defect being claimed has not been detected by the seller within the framework of the guarantee claim settlement, or if the guarantee does not apply to the defect of the product pursuant to Article 4 of the Guarantee Claim Guidelines.
4. If the defect being claimed has not been detected, and the functional state of the guarantee claim object has been demonstrated to the customer, the customer is obligated to refund the provable expenses incurred in connection with expert assessment of the defect being claimed.
5. If, during the process of assessment of justifiability of the guarantee claim, a defect of the product is detected which is not covered by the guarantee (a repair not covered by the guarantee), the seller shall notify of this fact the customer, and the customer shall notify the seller whether he wants to have this defect removed at a price quoted by the seller. Precise conditions of the repair not covered by the guarantee will be specified in a drawn-up report signed by the customer and seller. If the customer does not require the defect removal by a repair not covered by the guarantee under the conditions communicated by the seller, the device will be returned to the customer, after he has refunded the provable expenses incurred in connection with the expert assessment of the claimed defect.

The guarantee does not apply to the defects caused by the following:

1. Mechanical damage (e.g. by a fall, etc.).
2. Utilization of power supply units and other accessories that are not suitable, possibly, are not recommended for the particular product.
3. Interconnecting the product with non-standard accessories.
4. Installation or utilization of the product in contradiction to the operating instructions, or utilization of the product for purposes that are not usual for this type.
5. Incompetent handling, possibly intervention into the product by an unauthorized person or by a repair shop that has not been authorized by the manufacturer.
6. Damage caused by the natural elements (flooding, fire, etc.) or by other local effects (storm, mains over voltage, etc.).
7. Storage under conditions outside the temperature range.
8. Operation in a chemically aggressive environment.

Other guarantee claim conditions

The fact that the object of the guarantee claim does not correspond to parameters that have been set for other similar types of products can not be considered to be a defect. For the assessment whether a defect has occurred, the product parameters included in the technical documentation of the product are decisive.

The guarantee shall be terminated in the event of any modification of the object of the guarantee claim or in the event that the serial number of the object of the guarantee claim has been damaged or is illegible due to other reasons.

13. Guarantee certificate

Type of the device	
Serial number	
Guarantee period (in months)	
Seller	
Date of sale	
Stamp of the seller	

	1	2	3	4	5
Date of reception of the guarantee claim by the seller					
Number of the guarantee claim report					
Date of reception of the device into the repair shop					
Date of completion of the repair by the repair shop					
Number of the receipt form of the repair shop					
Guarantee repair	**YES – NO**	**YES – NO**	**YES – NO**	**YES – NO**	**YES – NO**
New serial number of the device (IMEI)					
Comments					
Stamp of the repair shop					